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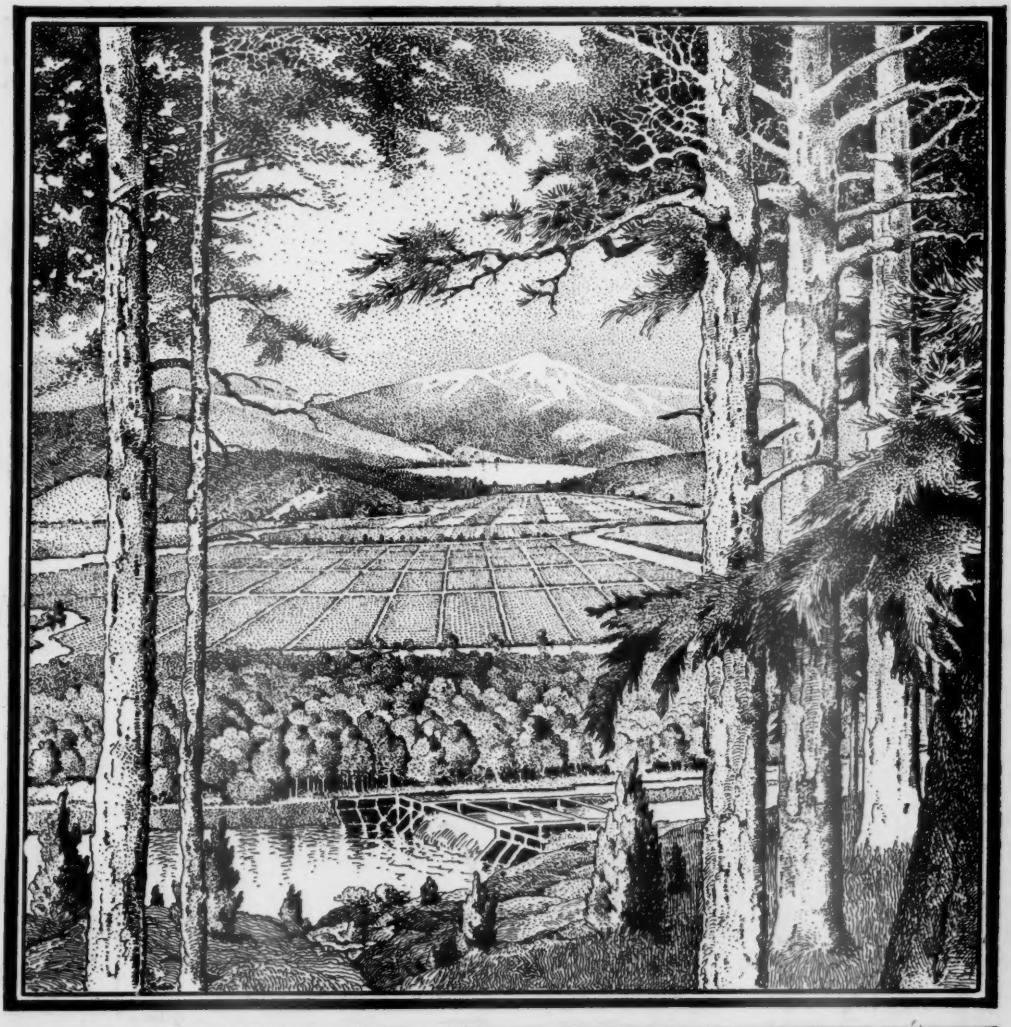

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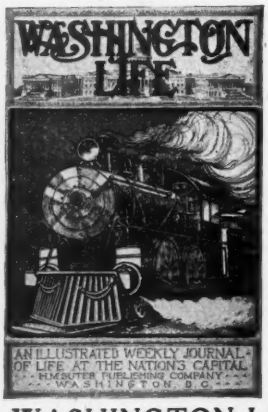
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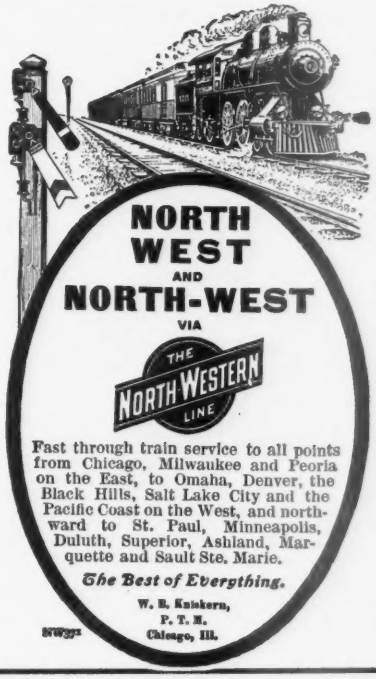

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The objects of this Association are to promote:

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2. The advancement of legislation tending to this end, both in the States and the Congress of the United States, the inauguration of forest administration by the Federal Government and by the States; and the extension of sound forestry by all proper methods;
3. The diffusion of knowledge regarding the conservation, management, and renewal of forests, the proper utilization of their products, methods of reforestation of waste lands, and the planting of trees.

The Association desires and needs as members all who are interested in promoting the objects for which it is organized—all who realize the importance of using the natural resources of the country in such a manner as not to exhaust them, or to work ruin to other interests. In particular it appeals to owners of wood-lands, to lumbermen and foresters, as well as to engineers, professional, and business men who have to do with wood and its manifold uses, and to persons concerned in the conservation of water supplies for irrigation or other purposes.

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Forestry and Irrigation

H. M. SUTER, Editor

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JOHN E. SHERIDAN

VIEW OF A GREAT NATIONAL IRRIGATION PROJECT

Congressional party gathered in circle during the speaking at the opening of the newly completed headworks of the main Truckee Canal, Nevada.

Forestry and Irrigation.

VOL. XI. DECEMBER, 1905. NO. 12

NEWS AND NOTES

The Januuary Meeting The attention of the members of the American Forestry Association is called to the announcement elsewhere in this number of the two-day meeting of the organization to be held in Washington on January 16 and 17. Matters of wide importance will be discussed and it is hoped that there will be a good attendance. All persons interested in forestry, whether members of the Association or not, are invited to attend this meeting. The sessions will be held at the New Willard Hotel.

Educational Use of Reserves In his article on the White Mountain Forest Reserve, on another page, Professor Rane touches upon a very important side of this forest reserve question—that is, the educational value of these great national forest reserves, administered by the trained men of the national forest service. No mere state reserve, no private work, can provide such an object lesson in the larger work and purposes of forestry. At present this privilege is confined to the large and thinly populated states of the great West, but it is needed in even greater degree in the more thickly settled East, where the forests are rapidly waning and the question of economical management and preservation has become a vital and immediate one. There are few areas left east of the Mississippi that require or admit this national management on a large scale. Of these few the proposed Southern Appalachian and White Mountain reserves are the chief—and now is the time for the nation to secure them.

Canadian Forestry Convention On January 10, 11 and 12, at Ottawa, will be held a Canadian Forestry Convention under the auspices of the Canadian Forestry Association. The official call for the convention was issued on August 21, by the Right Honorable Wilfrid Laurier, Premier of the Dominion, and since that time the Canadian Forestry Association has been engaged in arranging for the greatest and most representative meeting of its character that has ever been held in the Dominion. Discussion of subjects at the convention will be under the following divisions: (1) The Nation and the Forest; (2) Forestry in Relation to Agriculture and Irrigation; (3) The Forest and the Lumber and Pulp Industries; (4) The Relation of Our Forests to Our Other Industries: Railways, Water-powers, Mining, Building Trades, Woodworking Manufactures; (5) Scientific Forestry and Forestry Education.

In organization, the convention is to be modelled on much the same lines as the American Forest Congress (held in Washington last January) was; delegations are to represent all industries allied to forestry and the forests, and all interested organizations and societies are to be represented. Mr. Gifford Pinchot, Forester, U. S. Forest Service, will be present, representing the United States Forest Service, and it is probable that a number of the members of the American Forestry Association will also be present.

Forest Fish and Game Exhibit The New England Forest, Fish and Game Exhibition, to be held at Mechanic's Building, Boston, Mass.,

December 25 to January 6, promises to be of more than ordinary interest. Considerable attention is to be devoted to the forest exhibits, including displays illustrative of tree culture; forest botany, seeds, insects injurious to the forest, native woods, forest industries, forest instruments, etc. Part of the government forestry exhibit formerly shown at the Lewis and Clark Exposition has been loaned for the occasion; and in addition the Canadian government, and Provincial governments are to be well represented by generous exhibits, not only of forest resources, but also of specimens of food and game fish and animals, birds, insects, trade exhibits, and a large number of transparencies, photographs, drawings, paintings, etc., of out-of-door subjects.

Lessening Engineering Force

With the approach of winter a large number of engineers and assistants in the Reclamation Service are being laid off or given furloughs. There is a considerable demand, however, for these men, especially the active and experienced, and they find employment elsewhere, particularly on the new railroads now under construction or in the development of power and irrigation enterprises by private capital in the West.

The reason for dispensing with the services of these men is because the preliminary or reconnaissance stage of the work has been passed. Most of the important irrigation projects in the West have been examined, and the Secretary of the Interior has made a selection of the most meritorious. The engineering plans for these are practically completed or have reached a stage where construction has been begun or will soon be initiated.

As the construction work is usually done by contract, fewer government engineers are required under each project in the later stages of the work.

There are also a number of projects which the Secretary is holding under consideration, and which may not be authorized in the near future. Instructions have been given to close down the work under these projects, with the exception of perfecting the details in hand, in order that no time will be lost in taking up the work again whenever it has been approved.

North Platte Project

The work of construction on the North Platte project is progressing satisfactorily, notwithstanding some difficulty has been experienced by the contractors in securing laborers. On Division No. 1 a total excavation of 59,000 yards has been made, leaving 281,000 yards to be moved during the next five months. This will require a force of about sixty teams constantly on the work.

On Division No. 2 about 50 per cent of the yardage, or 151,000 yards, have been moved, and by employing the present force of laborers with seventy-six teams, this division of the work will be completed in two or three months.

On Division No. 3, which was sublet to Orman & Crook, the excavation to date amounts to 46,000 yards, leaving 230,000 yards of class one and 60,000 yards of class two and four material.

On Division No. 4, in charge of the Deadwood Construction Company, a total yardage of 65,650 has been moved, leaving a balance of 126,000 yards which will be completed by April 1.

On Division No. 5, under Orman & Crook, a total yardage of 143,000 has been moved, leaving a balance of 200,000 yards which can be completed by April 1 with forty teams. On this division all of the work is heavy cutting and filling, and in order to complete within the period of the contract the present force will have to be increased. No work has been done on Divisions 6 and 7.

James O'Connor, contractor on Division 8, has moved 62,000 yards out of a total of 292,000, and expects to complete the contract in time for the irrigation season of 1906.

View Showing a Stretch of Irrigable Lands that have been filed upon and Homesteaded under the Main Truckee Canal, Nevada; Five Miles Southeast of Wadsworth, Nevada.

V ew Showing Farm Lands Surrounding Wadsworth, Nevada, Embraced in the Truckee-Carson Pro ect.

No work has been done on Divisions 9 and 10. To complete the contract it will require one hundred and fifty teams.

Work on the government camp at Wyncote is well under way, and during the comnig month it is expected that all of the buildings and sewer systems will be completed.

Dike Building at Yuma

The Secretary of the Interior has authorized the U. S. Reclamation Service to proceed by force account to construct a portion of the great dike which is to be a part of the Yuma project, Arizona and California.

This authorization was given as the result of an injunction, which was granted by the owners of land upon which the dike is to be built, against the contractors. As the land involved was patented subsequent to October, 1888, it is subject to the right of way for canal construction by the authority of the United States, and the government, therefore, cannot be enjoined for the construction of a canal with dike protection therefor.

The work of the contractors will be diminished to the extent of the work performed by the government. The land owners are represented in Washington by former Senator George H. Turner, of Washington.

Future Labor Supply

The question of labor supply in the arid West is one of the most serious matters now confronting the engineers of the Reclamation Service. A number of small contractors have already failed because of the difficulty of obtaining labor, and others are on the verge of failure because they cannot obtain a sufficient number of workmen; nor are they able to secure the services of competent sub-contractors and foremen.

When the contractors are not able to keep up with the work it becomes necessary for the Reclamation Service to step in and push the work themselves, and to pay if necessary larger wages for good men. As a result of the enormous increase of railroad construction, laborers are not only very scarce, but very independent, and drift about from place to place after brief stops on each job. At all the labor centers extra inducements are being offered for good men. Car load after carload of laborers is started for the West, and every effort made to deliver the men, but in spite of great vigilance many of the men succeed in getting away before the destination is reached. They have enjoyed their little picnic and are not hankering for the real work. Some of them actually stay a few days and then drift on, while a very few remain on the job and appear to take a human interest in it.

One very difficult item to cope with in government work out in the arid region is the eight-hour provision, especially during the long hot days. Every man who is exercising moderately out in the sun with his attention distracted from the heat gets along with a reasonable degree of comfort, and it is only when he is compelled to sit around that he begins to appreciate the conditions. The long hours of enforced idleness, with absolutely nothing to do, away from every amusement, causes the men to think of little except drink, and in spite of every reasonable precaution bad liquor gets into every camp.

Many of the best workmen insist that under these conditions they would prefer to work longer hours and keep occupied except during the time needed for eating and sleeping. Having no home to go to and no place to stay except in the crowded bunk house, they quickly get discouraged.

Peculiar Flood Results

Its an ill flood that does no one good in southern California. The keenness with which the desert dweller goes after water was never better illustrated than in a recent case before one of the Departments.

It is the case of a number of settlers filing upon the waters of a slough, which was formed by the recent disastrous floods on the Colorado River,

and then seeking to enjoin a canal company from its endeavor to repair the damages which high water had caused to its canal system. The Colorado River, which burst its banks last summer, has been spilling over the sunken desert known as Imperial Valley, and has created a great inland sea that threatens to overwhelm several thousand homes, destroying millions of dollars of property. Along one of its flood channels it passes through an old slough, and certain settlers not unaware of the source of the water, but mindful of its great value in the desert, filed upon the slough, attaching thereby to themselves in perpetuity, in accordance with the laws of the state of California, a prior right to the use of these waters.

Meanwhile the canal company has been strenuously engaged in an effort to restrain the boisterous river within its proper banks. Every round thus far has been in favor of the river. Remarking these efforts the settlers who claim the slough have appealed to Uncle Sam to restrain the company, claiming that their present efforts threaten the supply of water in the slough.

Funds for Umatilla Project

The Secretary of the Interior has set aside the sum of $1,000,000 from the reclamation fund for the construction of the Umatilla project in Oregon, and has given authority for proceeding with the project with a view to its construction.

The approval is based upon the following conditions: First. That a satisfactory agreement or agreements be obtained from the owners of private property for the acquisition of such property as may be necessary or required for the proper construction of the project, and that no part of the moneys appropriated shall be expended for construction purposes or for tne acquisition of any canals, laterals, or other property until such satisfactory agreement or agreements have been obtained and approved by the Secretary of the Interior.

Second. That sufficient acreage of land under the project be pledged to the return to the reclamation fund of the moneys appropriated.

Montana Reclamation

A request has been received by the Reclamation Service through Senator Clark, from the Red Lodge Board of Trade, Montana, that an investigation be made of certain areas tributary to Clarke Fork River, with a view of ascertaining the feasibility of constructing an irrigation project in that section. Owing to the fact that it is certain canal construction and the necessary storage system would involve a very large expenditure, the settlers in the valley are extremely desirous that the government should take up the construction of the work, as it is apparently beyond private capital.

The area desired to be investigated has already received the attention of the Reclamation Service engineers, and their report will appear in the forthcoming Annual Report of the Reclamation Service, which is now being prepared for Congress. The valley of the Clarke Fork River is contiguous to that section in northern Wyoming which is embraced in the Shoshone project, and when the state of the reclamation fund will permit the construction of other works in Montana, it is probable that the Clarke Fork enterprise will receive further consideration. At the present time, however, the condition of this fund is such that it will be impossible to construct any portion of this or of several other meritorious projects in Montana. Nearly 9 per cent of the entire reclamation fund has been allotted for works in that state, and from this time the efforts of the Service must be concentrated on the early completion of the projects which have been selected and approved for construction.

Investigations in Montana up to the present date show that the entire reclamation fund of $30,000,000, if devoted to Montana alone and not spent in any other state, would not be sufficient for

the completion of the many excellent projects available. With the reclamation fund entirely allotted, the government engineers for the next three years will be busied in actual building, and will therefore be unable to give further consideration to other projects in Montana.

Tree Growth in South

The field of work of the Forest Service, carried on for the past year in the Southern Appalachian forests, is now finished. During the past few months a party of six men has been engaged in collecting figures showing the volume and growth-rate of chestnut oak. This study completes the data required by the Service.

The results of this investigation will be used to determine the best system of forest management for these forests, and also to show approximately the stand of timber remaining. In case a national forest reserve is created in this region the facts gathered in this study will be of great value in managing the timber lands conservatively.

Special Uses of Wood

In connection with the studies of woods for special uses, which the Forest Service is carrying on, Mr. C. L. Hill, of the Service, is now in New York, where a good deal of wood paving is being laid, in order to study the operation of laying and to confer with engineers; and Mr. H. B. Holroyd is making a trip through Indiana, Illinois, and Wisconsin, investigating vehicle woods. The specific objects which Mr. Holroyd has in view on this trip are the selection of various woods to be tested for their adaptability for vehicle and implement manufacture, and to arrange for co-operative studies of such woods, shared by the Forest Service and manufacturers.

Southern Forest Studies

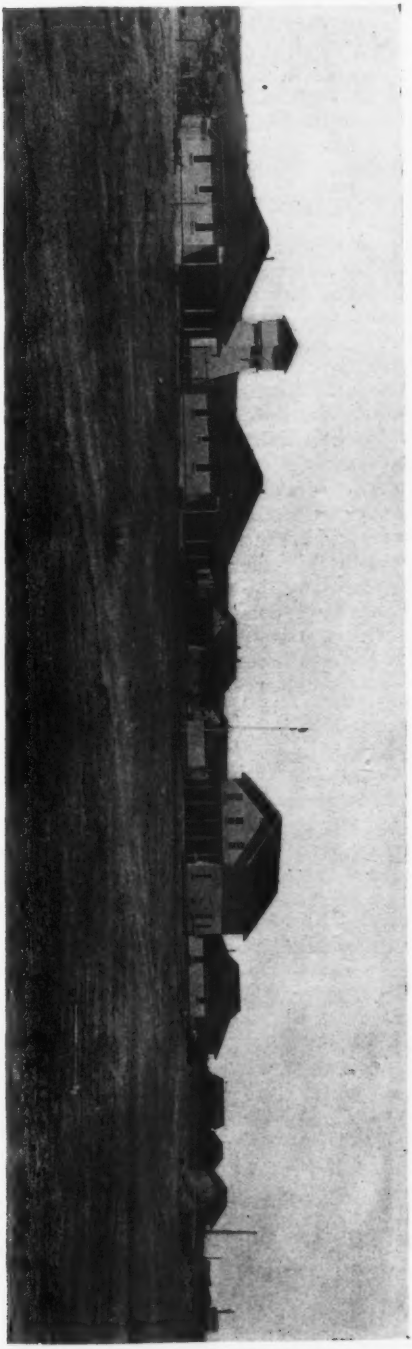
Mr. K. W. Woodward, of the Forest Service, has gone to Georgia to make a preliminary examination of a tract of 2,500 acres of pine land, for which the owners have asked the Forest Service to prepare a working plan according to the usual plan of co-operation. After finishing work on this tract, Mr. Woodward will go to Florida to make a similar examination of over a million acres of pine land.

During the winter Mr. Woodward will be engaged upon a study of the red cedar in the South. Red cedar is the best wood for the manufacture of pencils, for which a soft wood of straight grain, free from imperfections, is necessary. A study of this tree will supply valuable information concerning its growth, distribution, and forest habits, which will serve as a basis for the application of forest management to cedar forests, and thus help to make permanent the supply.

Turpentine Work

Mr. George B. Sudwort, dendrologist of the Forest Service, recently made a trip to inspect the progress of the new turpentine investigations which the Service is carrying on in cooperation with the Hilman-Sutherland Land Company, near Jacksonville, Florida. These investigations are designed to test an improved system for scarifying trees for turpentine.

Some two years ago, as the result of a study by the Forest Service, there was perfected a new system of turpentining called the "cup-and-gutter" system, which does away with the earlier practice of cutting deep boxes in the bases of the trees and very materially lessens the injury done to the trees, so that much is gained in economy of production. Yet with this system, as with older systems, large faces are chipped on the trunks, causing wounds which limit the productive life and vitality of the trees. The turpentine industry, like the lumber industry, is so extensive that there is need to use all possible economy, and the present experiments which the Forest Service has under way are designed to prolong the productive life of trees worked by the use of a new method of chipping, without, it is hoped, reducing the average annual yield.



View Showing Government Buildings at Hazen, Nevada; Truckee-Carson Reclamation Project.

Salt Lake Forest Reserve

During the summer Mr. James M. Fetherolf and Mr. Walter B. Hadley, of the Forest Service, have been engaged in making a reconnaissance of the Salt Lake Forest Reserve in Utah, with a view to determining the best means of reforesting denuded areas in that reserve.

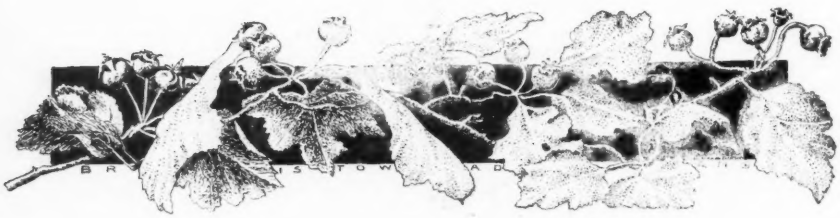
Early lumbering in this region severely overtaxed the supply and stripped the mountains of their protective cover. Fire and grazing also did their share toward reducing the clearings to barren stretches clothed only with stumps and stones. This has resulted in rapid run-off, and hence the irrigation needs of the Salt Lake Valley are greatly threatened.

The summer's study resulted in a map showing the various forest conditions on the reserve, and in the adoption of a definite system of reforestation. The first step has already been taken toward the establishment of a forest nursery. In the nursery seedbed there will be grown from seed red fir, Engelmann spruce, and western yellow pine, the first tree preponderating. It is estimated that about a million seedlings will be thus started in a year. After a year's growth the seedlings will be set out in nursery rows for two years more, and finally transplanted to the denuded forest areas.

Interest of Wood Working Industries

A committee of three has been appointed in the Forest Service to work with the forestry committees which have recently been appointed by four large wood manufacturing associations. The names of these associations are as follows:

The National Hardwood Lumbermen's Association, The National Association of Box and Box Shook Manufacturers, The National Slack Cooperage Manufacturers' Association, The National Coopers' Association. The forestry committees of the associations are composed of business men of wide influence, and the committee of the Forest Service will be charged with furthering the forest interests which each of these lines of manufacture depends upon. The two chief objects sought by this collaborative arrangement are, first, a statement of the main problems which each of the industries has to solve, and second, to promote the work of the Forest Service in the study of woods best suited for these industries, and the application of forest management and forest extension in handling timberlands owned by association members.



MEETING OF THE AMERICAN FORESTRY ASSOCIATION

To Be Held January 16 and 17, at Washington, D. C.

THE annual meeting of the American Forestry Association, as provided for in the by-laws of that organization, was held Wednesday, December 13, in the Atlantic Building, Washington, D. C. Owing to plans for an important meeting in January, it was unanimously voted to adjourn until January 16-17.

Arrangements are being made to make this January meeting of the American Forestry Association, to be held in Washington, D. C., a very important one.

This year the Association is conducting a vigorous campaign to secure the passage of a bill through Congress providing for national forest reserves in the Southern Appalachian Mountains, and in the White Mountains of New Hampshire. At the coming meeting much stress will be laid upon the necessity and importance of such action, and the entire morning session on January 17 (the second day) will be devoted to papers and discussion bearing upon it. Capable speakers wil present the varied phases of the question, both in the Southern Appalachian and White Mountains regions, and the more important of the interrelated questions, such as water-power, agriculture, effect of deforestation on stream flow and silt, forest fires, grazing, etc., will be considered with special reference to the section in which the proposed reserves are to be located.

As usual the business meeting of the American Forestry Association will occupy the first session on January 16, comprising, in addition to President James Wilson's annual address, the annual report of the Board of Directors, appointment of committees, and later their reports, and finally the election of officers for the ensuing year. In addition some time will be devoted to five-mniute *ex-tempore* addresses on general forest questions.

The second session, convening at 2 p. m. on the same day, will be devoted to the general sub-division, "Forest and Water Problems." The Association hopes to discuss a phase of this question which has not been undertaken at its previous meetings, notwithstanding its close relation to forestry. This is the question of water-power, and with it, electrical transmission. It is expected that two of the foremost authorities in the country will speak on these subjects. In the evening Mr. Gifford Pinchot, Forester, U. S. Forest Service, will tender a reception to members of the American Forestry Association at his home, 1615 Rhode Island avenue.

The morning session on the second day, as already explained, will be devoted to the Southern Appalachian and White Mountain interests. Questions of general forest policy will occupy the concluding session, beginning at 2 p. m.; especially will attention be directed to the pressing need for education in forestry, and particularly in the agricultural colleges and schools.

It is not intended that this meeting is to be a Forest Congress of the magnitude and scope of the one held a year ago; however, it will be a very important meeting to adopt plans for future work, and decide upon questions of policy. All organizations having an interest in forestry are cordially invited to send representatives to this meeting. The several sessions will be held at the New Willard Hotel.

THE PRESIDENT ON PUBLIC LANDS, IRRIGATION AND FORESTRY

Gives Marked Attention to These Subjects in His Last Message to Congress.

ONCE again I call your attention to the condition of the public land laws. Recent developments have given new urgency to the need for such changes as will fit these laws to actual present conditions. The honest disposal and right use of the remaining public lands is of fundamental importance. The iniquitous methods by which the monopolizing of the public lands is being brought about under the present laws are becoming more generally known, but the existing laws do not furnish effective remedies. The recommendations of the Public Lands Commission upon this subject are wise and should be given effect.

The creation of small irrigated farms under the Reclamation Act is a powerful offset to the tendency of certain other laws to foster or permit monopoly of land. Under that act the construction of great irrigation works has been proceeding rapidly and successfully, the lands reclaimed are eagerly taken up, and the prospect that the policy of national irrigation will accomplish all that was expected of it is bright. The act should be extended to include the state of Texas.

The Reclamation Act derives much of its value from the fact that it tends to secure the greatest possible number of homes on the land, and to create communities of freeholders—in part by settlement on public land, in part by forcing the subdivision of large private holdings before they can get water from government irrigation works. The law requires that no right to the use of water for land in private ownership shall be sold for a tract exceeding 160 acres to any one land owner. This provision has excited active and powerful hostility, but the success of the law itself depends on the wise and firm enforcement of it. We cannot afford to substitute tenants for freeholders on the public domain.

The greater part of the remaining public lands cannot be irrigated. They are at present and will probably always be of greater value for grazing than for any other purpose. This fact has led to the grazing homestead of 640 acres in Nebraska and to the proposed extension of it to other states. It is argued that a family cannot be supported on 160 acres of arid grazing land; this is obviously true. But neither can a family be supported on 640 acres of much of the land to which it is proposed to apply the grazing homestead. To establish universally any such arbitrary limit would be unwise at the present time. It would probably result on the one hand in enlarging the holdings of some of the great land owners, and on the other in needless suffering and failure on the part of a very considerable portion of the *bona fide* settlers who give faith to the implied assurance of the government that such an area is sufficient. The best use of the public grazing lands requires the careful examination and classification of these lands in order to give each settler land enough to support his family and no more. While this work is being done, and until the lands are settled, the government should take control of the open range, under reasonable regulations suited to local needs, following the general policy already in successful operation on the forest reserves. It is probable that the present grazing value of the open public range is scarcely more than half what it once was or what it might

easily be again under careful regulation.

The forest policy of the administration appears to enjoy the unbroken support of the people. The great users of timber are themselves forwarding the movement for forest preservation. All organized opposition to the forest reserves in the West has disappeared. Since the consolidation of all government forest work in the National Forest Service there has been a rapid and notable gain in the usefulness of the forest reserves to the people and in public appreciation of their value. The national parks within or adjacent to forest reserves should be transferred to the charge of the Forest Service also.

THE FOREST SITUATION IN NORTHERN NEW HAMPSHIRE

BY

GEORGE T. CRUFT

President of the White Mountain Board of Trade, and Treasurer of the Society for the Protection of New Hampshire Forests.

THE manufacture of paper from spruce has made very great changes in the forest situation in northern New Hampshire during the last ten years. Cities of 12,000 inhabitants, like Berlin, N. H., have sprung into existence. Lincoln, N. H., is another young city. The older towns, like Littleton and Lancaster, have felt very strongly the impetus. The total capital invested in twenty-nine paper and wood pulp plants is rated in the twelfth census of 1900 at $8,163,081, paying annually in wages $1,036,856, and turning out an annual product of the value of $7,244,733. These astonishing figures do not include the saw mills and other manufacturing plants aside from the paper and pulp industries, nor do they include the very active logging operations in the woods. Two paper mills of the largest capacity have been put in operation within the last three years. Not only New Hampshire, but all New England, feels the stimulus of this new and prosperous business.

With this advance, it is not surprising that the values of spruce lands have greatly advanced. A rise of more than 50 per cent has occurred during the decade, and prices are likely to go still higher, for we learn from the report which the United States Forest Service has recently made on northern New Hampshire that there are standing 4,764,000,000 feet board measure of coniferous timber. This is mostly spruce and fir. The annual cut is given as 225,000,000 feet. If there were no new growth, therefore, and no importations from Canada and elsewhere, the supply would last twenty-one years. The annual growth in the forest is large, and 37 per cent of the amount needed is already imported from Canada; but there is a constantly increasing demand with a correspondingly larger output which tend to make the time of exhaustion nearer at hand. With the constant growth in population of the country it is inevitable that the output must be larger.

It is not surprising, therefore, that those who know and love the White Mountains should be anxious lest the beauty of the mountains be despoiled. Inquiries come from all parts of the country, not only from those who formerly lived in New Hampshire, but also from that much larger number who have visited its places of rest and recreation, particularly from the Middle West: What can we do to help the reservation in the White Mountains?

The White Mountains have long served to make life more tolerable to many thousands of busy men and women—the brain workers of the country. The forests in places of special beauty throughout the mountains are more serviceable to mankind by standing than by being ground into paper pulp for a day's convenience in reading the news. The movement to protect the forests is already too late to do its most effective work. Some of the forests most valuable because of their attractive location have been cut away during the last three years, and this, too, on the Presidential Range, where, of all places, the axe should be restrained.

There remain but two primeval forests on the Presidential Range. The Randolph forest is the one referred to above as having been partly cut away. It was twelve miles long and four miles wide, extending over the northern sides of Jefferson, Adams, and Madison, stretching up to 4,000 feet above the sea, and from it rose the majestic peaks of the Presidential Range. Four hundred men cutting for three winters, distributed throughout the forest in eight camps, have done irreparable damage. But there remains the most beautiful portion of it, at the eastern end, up the famous "Valley Way" between Mt. Adams and Mt. Madison. Two new camps have just been put in to cut this off, also, during the coming winter. Only immediate action will be of any avail.

The other primeval forest on the Presidential Range is on the southern slopes of Mount Washington, in the vicinity of the Pinkham Notch. Although less accessible and somewhat less attractive, it has wonderful beauty, and appeals to the imagination. This property is on the market and in danger of being cut off.

In other parts of the White Mountains there remain a few pieces of primeval spruce, which, because of their attractive location, should be reserved for higher service. The northern slopes of the Franconia Mountains have lately been cut over. Within a year, in and about the Notch, ugly slashes have been made. On the southern slopes the mountains have generally been cut over more heavily, and the tracts of primeval timber that remain are therefore more important. Valuable pieces of timber occur also in the Dixville Notch, and surrounding the second of the Connecticut lakes. Words cannot be used too strongly in urging the preservation of these remnants of the primeval forest.

But it is not alone for the primeval forest that New England desires a national reservation in the White Mountains. To make continuous, through judicious cutting, the industries previously mentioned, and to protect the headwaters of every important river in New England, save one—these are the strong economic reasons for the reservation. It is desirable and, if the reservation is to be effective, necessary, that the United States Government acquire not only the pieces of virgin forest remaining, but also large areas of cut-over lands, in order to put them under forest management. This is the only means of preventing the tremendous losses by fire and by erosion which have already rendered completely and permanently barren 84,000 acres in the mountain regions that were formerly covered with forest growth. One of the most interesting features of the proposed reservation is that, if the cut-over lands are put under forest management for the purpose of future commercial returns, they become at the same time far more attractive. It is a case of having one's cake and eating it, too.

There is no possibility of adequate action except by the United States Congress. The interests involved extend far beyond New Hampshire—the interests and prosperity of New England are concerned. New Hampshire will do her part, as much, and more, than any other state in proportion to her population and wealth. The state already has caused to be made a complete survey of the mountain region by

the Forest Service at Washington. To secure this reservation in the White Mountains, all New England should unite, and all friends of the White Mountains throughout the country may extend the agitation and urge their congressmen to vote for these measures.

IRRIGATION IN THE NORTH PLATTE VALLEY

BY

ROBERT TUDOR HILL

IF IN any phase of economic life man is the creator of his circumstances, it certainly is true in a good system of irrigation. Then he is his own rain-maker, in a sense of the word, and, provided the good Lord fills the river upon which the water system depends, the irrigation farmer is a comparatively independent individual. Rain or shine, wet or dry, wind or calm, it makes but little difference; if he can get the water, he is a happy man.

Modern irrigation systems are not widely different from those of ancient and medieval times, whose traces may be found in many places; but they have been so highly developed, and made so completely adequate to the needs of man, that we can easily forget that we have only developed an old idea. Irrigation, in itself, is the salvation of a country which has little or no rain, for it turns land absolutely worthless, because dry and barren, into blooming and productive fields, and consequently raising land values from practically nothing to many dollars per acre. A single irrigation system is like an inverted river system. The water of the river flows from a diminutive source to a wide mouth, the volume being increased by tributaries. The ditch water, however, flows from a wide mouth until it is lost in the fields, while the laterals draw from, instead of contributing to the system.

The North Platte valley is not very wide; in fact, it is simply the flood plain of the present river, which, by the way, is never flooded, and which, in early geological times, was the actual basin of a large river. It varies in width from four or five miles to twelve and fifteen miles, and beyond rises to high dry lands and sand hills. The river channel averages about a half a mile in width, but is not filled with water the year around. In July and August the greater part of the channel becomes a bare expanse of shining and wind-shifting sand. In the spring months then, and during the early summer, the water must be used, when the river is higher and when the water level reaches above the head gates of the ditches.

To irrigate this valley of about sixty miles long and a few miles wide, in Scotts Bluffs county, Nebraska, bordering on eastern Wyoming, there are today at least seventeen ditches, varying in their lengths from five miles to twenty-five miles, and correspondingly in their widths from one hundred and fifty-six feet at the head gate of the farmers' canal to two feet or less at the lower end of any ditch where it runs out. The size of an irrigating ditch depends not so much upon the distance to which the water must be carried as to the amount of land it must supply with water, and consequently with the number and size of the laterals.

A lateral is a branching ditch, no matter whether it be large or small. They are always fed by what is known as a lateral gate or box which meas-

ures and gauges the flow of water. These boxes are chutes for the water to pass through so as not to tear away the embankment. They are equipped with a sliding gate, which is raised or lowered according to the amount of water needed, which is allowed in the contract, and according to the head of water on, or, in other words, according to the amount of water flowing in the ditch.

There are two systems of water measurement, namely, the "miner's inch" and the "second foot." In both cases these are the units of measure. The first is used in older irrigation districts, the second finds favor in newer regions. Under the "miner's inch," the usual quantity of water estimated as required for one acre during one year is that amount which will flow continuously for the season through an aperture of one square inch; of course, this varies with the nature of the soil and with the "lay" of the land. The farmer is also entitled to four inches pressure or head of water—that is, the water should rise four inches above the lower edge of the sliding gate on the outside. If the water does not reach this height, the farmer is entitled to raise the gate enough to compensate, because the amount of water passing through a gate will vary considerably with the pressure behind.

The "second-foot" system, as the term signifies, provides for a cubic foot of water for every second of time.

Stacking Alfalfa.

The water pressure must always be taken into consideration. Water appropriations in Nebraska for irrigation allot a second-foot of water for each seventy acres of land. These two systems vary more in their methods than in the final results.

Up to the present time, however, while there are rules and regulations for measuring the water and purchasing it, more or less liberty is allowed, as water has never been so scarce during the seasons when most needed that

it has been necessary to enforce rules very strictly, except in the later summer weeks each year, when the river falls and when the "ditch rider" must pro-rate the water among the buyers. In this case, if a man orders into his laterals on a certain day, say forty inches of water, which is measured by a lateral gate twenty inches wide, with a gate lifted two inches, and with a head of four inches, he does not get that amount, but perhaps only eight-tenths, or thirty-two inches, in which case he must lower his gate to get his lawful share. Also, he cannot take it at any time he wishes, but he must consult the 'ditch-rider," who allots to him his time for drawing off water. In this way, all are treated fairly, and this is the most difficult task for the "rider," because, in addition to riding along the full length of the ditch every day to examine it, he must figure out very clearly just how he must pro-rate the water and at a time when he has the least amount available.

Ordinarily, under irrigation, the fields are given two good soakings as early as possible and one later on. This applies particularly to alfalfa. A field is flooded as carefully as possible, and consequently flat-lying land is much more easily handled, for, with small dykes and intersecting ditches, the water can be spread evenly. But on sloping land the low-lying places always get more than their share, and there is a tendency for the water to wash out the soil as it seeks the lower level. A ridge in a field is a farmer's problem and it gives him no end of trouble until he simply cuts it away.

A Wheat Crop of Fifty Bushels to the Acre

In the North Platte valley, as in nearly all irrigation regions, there are two systems of irrigation—that is, as to the business organization. These are the corporation or company system and the district system. As this is

a non-partisan article, only an outline of the two systems is given, because it has been and is today one of the moving and important questions with which the irrigation community must deal.

The company system is typified by the organization of the Winter Creek Ditch Company. This ditch was begun in 1889 and finished about two years later. Those interested built the canal themselves, during the winter months mostly, and took out the value of their labor in stock in the company. There was a regular organization perfected with officers and directors. This organization remains today in spite of efforts made to change to the other system. The water is sold to the consumer at so much per year, averaging $160 for each quarter section of land, or at $1.00 per acre. Originally, when expenses were low and the company and land were new, the cost was twenty-five cents per acre. But with the increasing valuations and with the augmented cost of maintenance, the price of water has been raised gradually to the higher figure. Last year, for the first time, a dividend was declared on the stock, of 3 per cent. While the farmers have realized practically nothing on their stock holdings, they have experienced an increase in the value of their land from almost nothing to as high as $200 per acre, which has more than paid them.

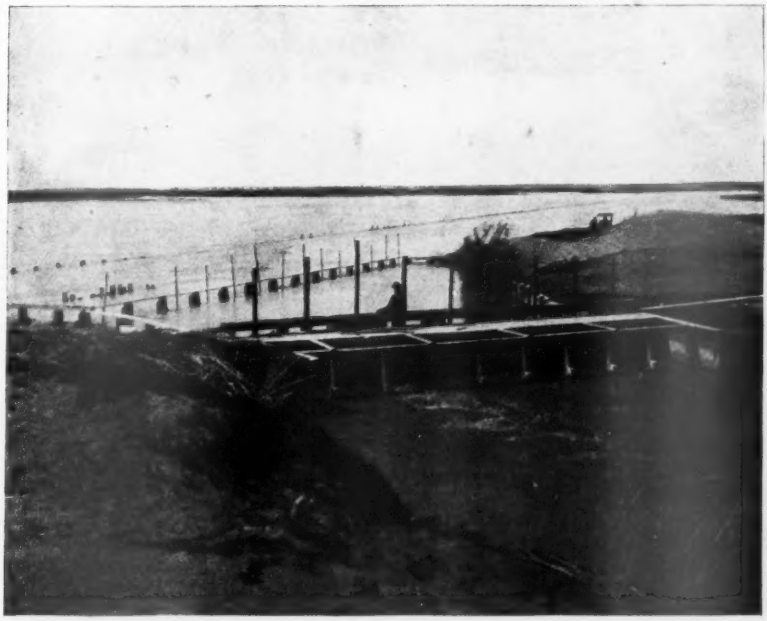
In short, the corporation system is built upon the same line as any other like business organization, and the affairs are conducted more nearly like any other business. The administration of finances is vested with the officers and board of directors, and a stockholders' meeting is called annually, at which time all stock is represented by actual holders or by proxies. In this system, a man buys land and with it the right to a stipulated quantity of water; but there is nothing to prevent the price from being raised beyond an unprofitable figure—to the farmer—if the stock becomes controlled by single interests. However, under ordinary circumstances the stockholders have the final word.

Under the other system, we find an organization perfected upon the same lines as a school district. It is the district system. All of the land along the route of a contemplated ditch, or after construction, which can be watered from it, is by popular vote made a district, with the proper officers. The district organization is empowered by law to issue bonds for construction in the same way as a school district issues bonds to build a school house. Every land owner, then, in that district is assessed according to his acreage. The tax levy is made to cover ditch expenses, to purchase water, to cover payments on the district bonds, and to create a sinking fund to pay off the bonds as they mature. In an irrigation district each owner of forty acres has one vote, but no one person has more than one vote, no matter how large his land holdings.

The cost to the farmer under this system is practically the same as in the other. The superiority claimed is that the advantage of increased valuations are distributed more or less evenly to every land owner, whether he uses the water or not, for every acre has a share in the country's prosperity. It makes the man who holds land merely for speculation or who is waiting for simple value accretions without the application of real labor for improvements pay his share of the costs of development, as well as he who, laboriously, from year to year, brings his land into good condition. To sum up, the principal advantage claimed for this system is that every man pays his share of the cost of developing the country if he hopes to reap any benefit thereby. The system is designed to prevent speculation, and the water user is supposed to get water at a minimum cost. When the bonds issued for construction expense are paid, the land owners get free water, except that the district, of course, has to pay for maintenance and superintendence.

The kind of crops raised in the North Platte valley, as in other like places, is slowly but gradually changing. This is due to a considerable extent to the construction of a line of the Burlington Road through the valley within the past five years. There is also a tendency for irrigation farmers to retain rather a small acreage, and devote themselves to intensive rather than to extensive methods of cultivation as heretofore. Many a farmer who wishes to hold for himself only what he can personally care for will lease or rent out three-fourths of a quarter section, retaining perhaps forty acres to which he devotes his attention. Labor is scarce in such new districts and farmers are forced to do this, or allow part of their land to lie idle or keep it for grazing purposes, or perhaps raise crops which take little attention while yielding fair returns, such as alfalfa or wheat-grass hay, both of which yield well under irrigation. But irrigated land is too valuable to use other than in intensive agriculture.

Present estimates of crop returns show that on the average twenty-eight bushels of wheat are obtained to the acre, with the yield going as high as fifty bushels. This is a good hard wheat and makes excellent flour. Oats average thirty bushels to the acre and sometimes reach ninety bushels; this is a good, full, heavy grade of oats. Corn is not a good irrigation crop, or rather other crops pay better; very little of this cereal is raised.



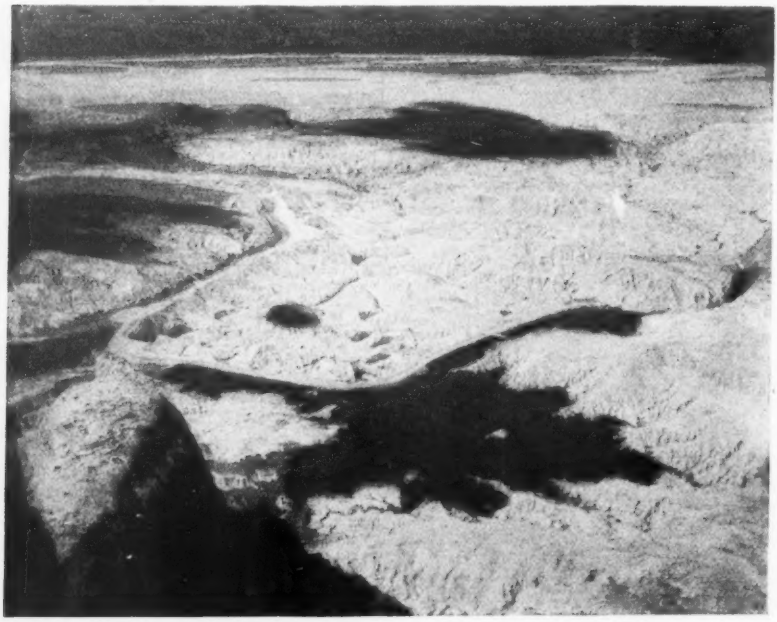
A Typical Headgate on the North Platte. There are nine gates, as shown by uprights.

Three cuttings of alfalfa are made every season, the first being the best. The average yield is five tons to the acre, but it may reach seven and eight tons. This is a valuable forage plant and is particularly good for growing

cattle; a ration of grain is necessary for fattening them. Alfalfa may be stacked in the summer and fall and late in the spring, and a year or more later the inner part of the stack will be almost as green and fresh as when cut. This is because of the dry atmosphere through the winter. On all hay the curing process can go on almost without interruption. The consequence is that there are few storage barns. The average price paid for alfalfa during the past three years has been $3.50 per ton. Alfalfa is also a wonderful fertilizer and subsoiler. Its roots reach into the soil from ten to twenty feet, and when the sod of an alfalfa field is broken for planting grain crops the farmer expects rich returns, and seldom is disappointed.

What is known as wheat-grass hay, and which is becoming known the country over among feeders of fine stock as a valuable forage plant, yields from one to two tons per acre. It requires practically no care and yields one cutting. During the past three years $6.00 has been paid per ton. Some quantities have been shipped to breeders of fancy stock and horses in Massachusetts, Connecticut, and New York, where it brings high prices.

Today, potatoes are attracting the attention of irrigation farmers. The average yield during the past two years has been one hundred and fifty bushels to the acre, and in some cases yielding as high as six hundred bushels. Previous to three years ago, potatoes brought between 30 and 40 cents as an average; now 80 and 90 cents is sometimes paid, with the average between 50 and 60 cents. It is found that the light soil is particularly adapted to the cultivation of very fine tubers. Farmers are now planting



The Gering Ditch Reservoir in the "Bad Lands" at the Base of the Famed Scott's Bluff. View from an elevation of over 500 feet. North Platte River beyond.

seed potatoes obtained from the Red River country of the North, having learned that imported seed stock yields vastly greater results, and especially the Red River potato.

This is but an instance of the application of scientific methods in agriculture and shows what schools of agriculture and farmers institutes are doing for our country. An interesting sight is carloads of potatoes shipped out for the market and other carloads shipped in for planting, and all handled on the same day.

A little story is told of potato culture which also illustrates scientific methods. It is of a progressive farmer who proposed to plant potatoes on non-irrigable land, but who expected to provide moisture by planting onions along with them, so as to make the potatoes' eyes water. As to results we cannot vouch, but it is true that irrigated onions have proved a wonderful success when the market offered reasonable prices.

In addition to this latter crop, irrigation yields vast returns in sugar-beet culture. A sugar-beet factory site is now surveyed and considerable land is owned by a wealthy company. Small fruits and vegetables are natural crops for irrigated land and already many acres of strawberries are under cultivation and will be yielding large returns within one or two years at the most.

Irrigation in this valley, set apart by itself, is practically in the same state of development as all other like irrigation regions—just at the beginning of great possibilities. It means that that vast region of what is commonly known as the "great arid West" is just waiting the application of American industry, brain, and brawn to transform it into wide reaches of beautiful farms and gardens, surrounding happy homes.

FORESTRY IN MARYLAND

BY

WILLIAM BULLOCK CLARK

State Geologist of Maryland.

MARYLAND has done little hitherto to protect her forest interests. By an early statute the malicious setting on fire of any woods is punishable by a fine in a few counties, but as no special provision is made to enforce it the law affords inadequate protection and can never completely control the evil. At the last session of the general assembly a general law was introduced, but received little support from the state's representatives. With the passage of progressive legislation elsewhere and the recognition on the part of many intelligent citizens that the state's forest wealth is being rapidly depleted, there is evidence at the present time of a more aroused public interest than in the past, and the day is not far off when Maryland will take her place with the other states in placing adequate forest laws on her statute books. It is coming to be realized that not only should the remnants of our present forests be preserved, but intelligent treatment should be given to the large deforested areas that cannot in all probability be made available for any other purposes. An educational campaign is under way that is adding many recruits to the forestry movement.

While Maryland has been thus backward in passing adequate laws to conserve its forest wealth, systematic investigations of its forest conditions have been under way for the past six or seven years. In 1896 the state made provision for the establishment of a State Geological and Economic Sur-

vey, and early in its career this bureau arranged for a co-operative survey of the wooded areas of the several counties with the then Bureau of Forestry of the United States Department of Agriculture. The topographic survey of the state was already well advanced and the experts detailed by the national bureau platted the results of their field observations on the detailed maps at their disposal. This important work, which has been carried on at intervals since it was first inaugurated, has already resulted in the mapping of the wooded areas of several counties, and there is every assurance that the entire state will ultimately be mapped in this way.

Investigations to date have been completed for Garrett, Allegany, Cecil, St. Mary's, Calvert, Worcester, Kent, and Harford counties—eight of the twenty-three counties of the state. Reports giving a detailed account of the forest conditions have already been issued by the Maryland Geological Survey for Garrett, Allegany, and Cecil counties, while the manuscripts relating to St. Mary's and Calvert counties are awaiting publication. A forest map of Worcester county showing the commercial types has already been printed, on the scale of one mile to the inch. The forest types are represented on the map in different colors and a convention is introduced showing

Barrens Timber; an area recently cut over.

Neglected Farmland, Eastern Allegany County, Maryland.

whether the trees are "young," "poles" or "merchantable."

It is believed that this detailed investigation of the forest resources of the state will afford a basis for a more intelligent treatment of the forest re-

A Good Stand, Sassafras Neck.

sources than would otherwise have been possible. The information will be at hand for the establishment of state forest reserves whenever Maryland is ready to segregate through gift, or purchase tracts for this purpose. To the investor the data thus rendered available will be of the greatest service. Of chief importance, however, will be the information given in these publications to the land owner in every county as to the best treatment to be accorded to his wood lands.

These investigations, however, would possess incalculably greater value and produce effects far more lasting if the state would make provision for a forester who could be consulted at all times by the people of the state, and who, with the information furnished by the reports and maps, could instruct those desirous of introducing practical methods in the handling of their woodlands, and especially in the reforestation of tracts but lately cut down. Proper protection against fire must also be secured by the designation of fire wardens for the several counties who in emergencies could secure helpers and who would necessarily be under the control of the state forester. When the amount of timber annually destroyed by fire equals in value that secured by the lumbering interests, it is high time that the same stringent laws should be passed in Maryland that have been found so efficient in other states. There is no question that Maryland could add enormously to her material resources in a comparatively few years by adopting those measures which the experience of other countries and in recent years the experience of many of our own states has shown to be so valuable in developing the forest wealth.

NATIONAL RECLAMATION*

BY

CHARLES D. WALCOTT
Director U. S. Geological Survey and the Reclamation Service.

THE propaganda for "National Irrigation" was pushed forward at all times, in season and out of season, by John Wesley Powell. From 1874 to 1892 it was always in his mind, and no amount of discouragement or defeat could convince him that it was not a wise thing for the nation, and that a full measure of success would come in due time. He lived to see the present reclamation act placed on the statute book and the great work begun.

Many men were associated with Major Powell in the pioneer days, but in the dark days of 1892 few spoke out so as to be heard. Irrigation was in disfavor at the Capital. Slowly the reaction came.

The National Irrigation Association brought together the friends of irrigation, and when organized by its effective and accomplished executive chairman, it became a power that produced results.

The propaganda among the people of the Middle and Eastern States began to bear fruit, and soon the senators and members from the Western States, who were making a great fight, began to feel that support was coming from unexpected quarters.

At this juncture a new and powerful force was added to the movement by the succession of Theodore Roosevelt to the presidency.

An earnest, ardent advocate, with knowledge of the subject from his life

*Paper read at the Thirteenth National Irrigation Congress, at Portland, Oregon.

in the West, he encouraged all workers and spurred them on to renewed efforts, and June 17, 1902, he signed the Reclamation Act, and thus closed the long contest for recognition and national aid in the irrigation of the lands of the arid and semi-arid states and territories.

EXECUTION OF THE LAW.

The time for propaganda and argument passed when the President signed the act. It was now the time to carry the law into effect. Under its provisions the Secretary of the Interior had charge of the execution of the law.

After consultation with the President, the Secretary placed the administration of the Reclamation Service under the United States Geological Survey, subject to the approval by him of plans of operations and of all contracts.

The Survey, through its Division of Hydrography, had been training a body of men for the work now assigned to it.

In 1894 Mr. F. H. Newell was appointed chief of a very small force, and began the organization of a body of hydrographers and engineers, which increased from year to year as the quality of its work commended it to the people and to Congress.

With this nucleus for a larger organization it was logical that the President and Secretary of the Interior should turn to it in initiating the greater work. The country was most fortunate in having at this critical period a President who fully comprehended and was in sympathy with the needs of the people of the western section of the country, where irrigation is necessary, and a Secretary of the Interior whose integrity and good business sense insured a conservative and business-like administration of the Reclamation Service.

No time was lost in getting the engineers at work and in developing the administrative organization so as to meet the constantly increasing demands upon it. The experience of the officers of the Survey in all departments was called into service, and both office and field work advanced without confusion.

ORGANIZATION AND DEVELOPMENT OF THE WORK.

During the past three years the difficult organization of a body of men, whose field of operations cover so large a territory, has been perfected, and precedents established along approved lines.

The general allotment of funds has been made with a view to the greatest benefit to the greatest number, and from the broad standpoint of the welfare of the country as a whole.

Construction is now in progress on eleven projects. These primary projects, or the first undertaken for construction in each state and territory, have been and are being selected in accordance with present knowledge to include conditions most favorable for rapid work and where there are least difficulties.

First consideration is given to whether public lands can be reclaimed and homes made on them, and where communities are threatened with extinction unless aid is given them by increasing their water supply. As each primary project is outlined, funds are tentatively set aside for construction, contingent upon obtaining right of way and the solution of various difficulties.

A list of the primary projects, showing the estimated cost and the acreage irrigable, is given below, divided into two tables, showing those under construction and those approved but where the final surveys and designs are not far enough along for the letting of contracts.

PROJECTS UNDER CONSTRUCTION.

State.	Project.	Acres Irrigable.
1. Arizona	Salt River	160,000
2. California	Yuma	100,000
3. Colorado	Uncompahgre Valley	125,000
4. Idaho	Minidoka	100,000
5. Montana	Huntley	35,000
6. Nebraska	North Platte	100,000
7. Nevada	Truckee-Carson	150,000

8. New Mexico	Hondo	10,000
9. North Dakota	Fort Buford	60,000
10. South Dakota	Belle Fourche	85,000
11. Wyoming	Shoshone	125,000
		1,050,000

In addition to the above, the following projects have been approved:

State.	Project.	Acres Irrigable.
1. Oregon	Klamath	236,400
2. Montana	Milk River	60,000
3. North Dakota	*Buford Trenton	18,000
4. North Dakota	*Bismark	15,000
5. Washington	Okanogan	10,000
		339,400

*Pumping.

Thus far, as shown above, projects have been approved for thirteen out of sixteen states and territories mentioned by the reclamation law, and construction is under way in eleven of them.

In several other states operations are at a point where advertisements for bids only await the removal of certain legal obstacles, the settlement of international difficulties, or the termination of delays on the part of local organizations or individuals.

SECONDARY PROJECTS.

In most of the states examinations have been made of all possible projects, and after one of these has been selected as the primary project for immediate construction, surveys have been continued of the secondary project, to be taken up on the completion of the first, or earlier, if for any cause the first project fails through any defect.

It is important to obtain systematically full facts concerning the water supply through several years, to make borings for foundations, and to prepare plans and discuss them thoroughly, so that the secondary projects can be taken up in the future with more complete knowledge than was possible in the first projects.

The Reclamation Service is constantly being importuned to make surveys in all parts of the country and expend the money broadly. The time has arrived, however, when it is necessary to limit general surveys, as there is not money in the fund to construct more than one or two projects in each state or territory, and general surveys will lead to expenditure without present adequate return.

DEVELOPMENT OF POWER.

One of the important features in the evolution of irrigation work is the development of power, which the numerous dams and drops in canals make possible.

Plans were made to transmit the power being developed in many sections of arid regions, by means of electricity, to points more or less distant, there to be used for raising underground waters, pumping water lying above the line of gravity canals, or for various other purposes, and attention was also given to the character of soils and of water to be used upon them, the materials used in the construction of the works, and numerous other details incident to reclamation by irrigation.

FINANCES.

In a work of the magnitude of that authorized by the Reclamation act, it is highly important to forecast the future in so far as past experience can aid in doing so, and to estimate as closely as possible the probable resources and liabilities that may be anticipated. A summary of the receipts from the sales of public lands in the reclamation states and territories for the ten years preceding the passage of the act shows that the maximum amount which would have been covered into the reclamation fund in any one year, had the act been in force, was $3,185,000, and the minimum $1,085,000, the average being $2,095,000.

Following the passage of the act of June 17, 1902, there was a great rush to take up land and a corresponding increase in the annual amounts available for the work of reclamation, but this condition cannot be expected to continue. The estimate for the future, as given in the last quarterly state-

ment, was that the receipts during the fiscal years of 1905 and 1906 would together equal those of 1904, $6,826,000, and that the increment thereafter would average $2,000,000 annually. Should this estimate be verified by the experience of the next three years, the entire receipts to the fund on June 30, 1907, will be $32,200,000.

It is important to emphasize this statement because there is a natural tendency to overestimate the resources available and to urge the taking up of additional work beyond the amount which conservative judgment will warrant. This is especially to be considered, too, because in the authorization of a project the letting of the earlier contracts does not indicate the total liability incurred, since other contracts must be entered into as the work progresses to a point where it is practicable to take up further details of the construction of the project.

REPAYMENTS.

The reclamation law provides that all cost of each project shall be returned to the reclamation fund by the settler in ten annual payments without interest. These will necessarily be small until 1907. After that a gradually increasing sum should be returned, and by 1910 two million or more dollars per annum should become available for new projects.

The annual payments may, at the discretion of the Secretary of the Interior, be not of equal amount, but may be graduated, so that the first payment, when the settler is least able to pay, is a smaller amount than later on.

PRESENT AND FUTURE.

The physical and financial situation has already been outlined. In Nevada water is flowing on lands from a government canal. This brings us face to face with the question of settlement under government reclamation projects. The primary idea of the reclamation propaganda and law is the making of homes for American citizens. Speculative intent is guarded against, also the demoralizing effects of gifts by the government to the individual. The government has done all that could be reasonably expected of it in providing land and water at cost. Each settler and community under a reclamation project is placed on an equal footing by the reclamation law—all have the same chance. Now the individual and the community have a duty to perform to the government; they must carry out in good faith all agreements for payment of principal and cost of maintenance. Any attempt at evasion or repudiation will arouse a sentiment throughout the nation that would be fatal to any greater development of the reclamation work in the future. I mention this, as suggestion has been made that the people will get relief from payments in the future. I trust that the good sense and business integrity of the western people will be so manifest, if any such proposals are made, that it will not be attempted a second time.

Much depends upon the success of the first few projects. The people of the whole country are interested and watching. The sentiment is pretty well squeezed out of the situation; it is a business proposition and as such must be worked out on business lines. The works must be well planned and built; estimates not greatly exceeded in cost of construction and maintenance; settlements of a good and permanent character that will meet all obligations and take full advantage of all opportunities for intensive cultivation of lands. If these conditions are met, the people of the country will say *well done*, and undoubtedly enlarge the work as rapidly as the opportunities for reclaiming lands and making homes are determined and recommended by the Reclamation Service.

Among the principles thus far developed that may aid in shaping the policy of the future, four may be mentioned here:

(a) The money resulting from the disposal of public lands belongs to the nation and not to any community.

When placed to the credit of the reclamation fund it will be used to provide the greatest number of favorable opportunities for home-makers, subject to the restrictions of the reclamation law.

(b) Each project undertaken must justify itself as an engineering and business proposition, and come within the requirements of the reclamation law.

(c) The funds available and to become available in the next few years will be too limited to provide for more than a portion of the projects that will ultimately be developed. The projects now under construction should be completed and justify themselves to the great jury of the American people before they are asked to give further aid to the reclamation of the arid and semi-arid lands of the West.

(d) The lands in private ownership which may be reclaimed must be subdivided and put into the hands of home-makers who will cultivate the soil in small tracts of 160 acres or less. Large land holdings must be subdivided or an agreement entered into to subdivide the tracts when water is available, in accordance with the terms of the Reclamation Act.

THE IMPORTANCE OF THE WHITE MOUNTAINS AND OTHER FOREST RESERVES FROM THE TEACHER'S STANDPOINT

BY

F. WILLIAM RANE
Professor of Horticulture and Forestry at the New Hampshire College.

WE shall take pride in our nation as a people in the future in proportion to our well-done deeds and accomplishments of the present day. We shall never have it to regret if at the coming Congress a law is enacted to set aside the proposed White Mountain Forest Reserve.

We of the old Granite State have already shown our interest to be unselfish by voting money for the preliminary survey, thereby placing the matter before the country as a business privilege.

This proposed White Mountain Reserve is beautiful almost beyond description. This scenic bit of country belongs to the nation, although it is located within the bounds of New Hampshire, as truly as though we had it enclosed in a beautiful glass case and on exhibition in one of the government buildings at Washington. Not only is this rare tract of our nation's pride beautiful, but our forest experts clearly demonstrate that by proper handling this territory cannot only always be kept thus, but be made self-sustaining and ultimately yield an actual income to the government. The whole question resolves itself down to whether it is more economical for us to acquire the property now, when it can be retained in its more or less normal condition, or wait until these conditions are far less desirable. The old adage that "a stitch in time saves nine" has its application in national affairs as well as in other and lesser walks of life. Were New Hampshire, which happens to be a small state, entertaining the nation at her own expense, she would likely find it burdensome, and be compelled to charge an admittance to meet expenses. Not having any restrictions, however, every other state

or citizen has equal privileges with her own.

Some persons seem to think that congressmen are prone to look at such questions only from the standpoint of sectional interests. The time has come when as Americans it is believed sectionalism is rapidly disappearing. We of New Hampshire can see the claims put forth by those interested in the proposed Southern Appalachian Reserve as readily as we do our own, and the agitation of the White Mountain proposition does not lessen, but emphasizes the importance of each.

Conditions have only come about in very recent years whereby Congress could feel justified in setting aside such vast tracts and feel assured that they would be handled judiciously. In a comparatively few years the whole matter pertaining to a systematic national forestry policy has been unfolded to us. With the rapidly extending and wisely guided corps of workers in the field that the nation is already so proud of, we can rest assured that governmental supervision, whereby conservative and economic methods will be carried out, is at hand.

The writer does not care to go into the discussion of other vital and all-important subjects that further go to emphasize the great importance of setting aside this area of our country. Students having given any attention to such subjects as the comparative evolution of nations, laying any stress whatsoever upon the results coming from efforts directed toward forest preservation and management, readily see corresponding results in individual nations' internal power and usefulness. It is not the duty nor is it possible for the individual or state to accomplish the broad and widespread usefulness that becomes the privilege of the nation to enjoy in solving these larger problems of the nation's future.

The writer, as the instructor of young men, who will ultimately become our land owners and agricultural leaders, finds his present duties utilized largely in demonstrating the practical solution of handling lands for definite purposes. Every state is interested in training its own citizens for their life work and hence developing men worthy of handling future problems. The majority of us in this educational work believe much good must ultimately come from this work, but we can do but little in furthering such a worthy problem as needs national solution at the hands of Congress. That every professor of forestry in the various states is doing what he can, however, to promote the interest and emphasize the importance of forestry throughout the nation, there can be no doubt. When I say, therefore, that the White Mountain Forest Reserve movement is backed by these men I feel sure of my claim. What is said for the White Mountain Reserve may be said equally for the Southern Appalachian Reserve.

We in New England believe fully that we take more pride and enjoyment when privileged to visit and enjoy the benefits to be derived from a visit to the Yellowstone National Park than our own citizens living in the West, and similarly do we find other people from other sections enjoying our beautiful White Hills of old New England.

We need to preserve the watersheds of New England for irrigating our valley lands and to give us an equitable water flow for our industries as much as do our western people to supply their great artificial irrigation systems. The government would not allow the forests removed after it had gone to great expense in building irrigation enterprises which depend upon such reservoirs for success; none the less should the White Mountain and other proposed reserves be allowed to succumb to injudicious management. While the conduits or streams are natural and have not been an actual outlay of expense to the government,

nevertheless the importance of their judicious husbanding by the nation is equally as great.

If the national government will look after the great watersheds and natural reservoirs of the country, the states will gladly improve and enhance their forest policies and resources. If, however, the larger and more important conditions that are necessary for best success are left uncared for the harder and less successful will be the efforts to maintain and develop what are really dependent conditions.

APPORTIONMENT OF THE RECLAMATION FUND

BY

H. M. SUTER

THE apportionment of the Reclamation Fund is naturally a matter of great moment to the several Western States and Territories within whose borders national works of irrigation are projected.

Recent comments and criticisms in leading western papers concerning this subject indicate that a misapprehension exists in the minds of the writers especially in regard to the interpretation given to the act of the Secretary of the Interior in setting aside certain money for a project. It is not to be inferred that by "setting aside" or apportioning money, it is actually taken out of the treasury or put by itself. On the contrary, the amount is simply entered upon the books as the proposed limit of future expenditures. The difference between this apportionment and making an actual contract to pay money has often been misunderstood. They are entirely distinct. To illustrate: When the surveys are completed and the feasibility of a project ascertained a concise report is made to the Secretary with the recommedation that the scheme be approved and the amount required in construction be set aside contingent upon the fulfilment of certain conditions which usually relate to vested rights and the co-operation of owners of lands under the project.

In making this allotment the Secretary has incurred no legal or moral responsibility. If, however, a contract is let for an integral part of the work, the Secretary then assumes a legal responsibility for that part only. He must be absolutely certain that there is sufficiently money in the treasury to complete this contract even though final payments may not be required for several years. At the present time actual construction is in progress on portions of eleven great projects requiring about three years for their completion. The estimated cost of all parts of these projects is about equal to the total amount now in the Reclamation Fund.

THE PRODUCTION OF OIL OF WINTERGREEN

BY

HAROLD DAY FOSTER

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THE "oil of wintergreen" of commerce is the product of the distillation of an etherial oil. It was formerly obtained from the leaves of the wintergreen or checkerberry (*Gaultheria procumbens, Linn.*). But the production of the oil from this species has been largely discontinued owing to the great cost of gathering the plant in sufficient amounts. Almost all of the "natural oil" now on the market is obtained from the sweet birch (*Betula lenta, Linn.*).

This tree has a wide botanical distribution in the eastern United States, but it is in the southern Apalachian Mountains that it occurs at its best. Here it is found as a timber tree of some importance and is lumbered for its wood which is used in the manufacture of furniture. The bark alone is utilized in distilling the oil, and in some regions where the tree does not attain to sufficient size to make good saw stock, or for local reasons there is not a satisfactory market for the lumber, the bark is peeled from the felled trees which are then discarded. The following notes on the distillation of birch oil apply to the industry as it was observed in McDowell county, North Carolina:

In this region the hardwood forests are being lumbered and the merchantable trees of the many species which occur here are being taken out. Some birch lumber is sold to the furniture trade, but as a rule birch is a poor seller and only a few trees in this section are large enough to make good lumber. Distillation of the oil is carried on by local residents. The lumber company charges the distillers 20 cents for every tree cut, deducting this amount from the proceeds of the sale of the crude oil.

After felling the trees they are peeled while green. It is essential that the bark be green, for if it is allowed to dry out before being used it becomes worthless for distilling purposes owing to the rapid evaporation of the etherial oil. The bark is stripped from the trunk and stump and the larger limbs, but the twigs and the bark of the smaller branches are not used. (See illustration No. I.) The bark is brought to the distillery and put on the floor around which there is a narrow strip of lumber forming a shallow box. Here it is chipped up fine with axes. Everything about the distillery and the methods of distilling are simple to the point of crudeness.

The distillery most commonly consists of a floor on which the bark is chipped, and one or more vats or stills with their condensers, and these are roofed over with a rude framework of poles covered with hemlock bark. This shed serves to protect the birch bark from the drying sun, and the fires from rain, as well as shielding the workers from the weather (See illustration No. II.)

The stills are 3 feet wide by 4 feet long and 3 feet deep. They are constructed of wood with cast iron bottoms and steam-tight tops or covers. The still is placed in position on two parallel rows of flat rocks one under each side of the box, leaving a space underneath on which fire is placed. The smoke escapes through a vent or low chimney of flat rock at the rear.

Inside the box and about 4 inches above the iron bottom is a grating of

wooden strips 4 inches wide and placed about one inch apart. Under this grating water is boiled by a fire placed on the ground under the iron bottom, and the chipped bark rests on the grating. The grating thus keeps the bark out of the water and the steam alone, as it rises through the still filled with bark, extracts the oil.

After filling the still with finely chipped bark the top is placed on and held firmly in position by sticks and wedges. The steam rising through the grating and permeating the bark extracts and vaporizes the oil and carries it to the top and through an iron pipe or worm. This "worm," however, is not coiled as in the condensers of liquor stills, but is a simple straight iron water pipe. In some cases it is bent to form a connection with the side of the vat; in other cases a wooden plug is wedged into the opening of the vat, through which an auger hole is bored, taking a right angle turn in the center of the block of wood. In the other side of the plug, at right angles to the side against the vat, the straight pipe is inserted, thus obviating the necessity of bending the pipe and plugging the opening in the vat around the pipe.

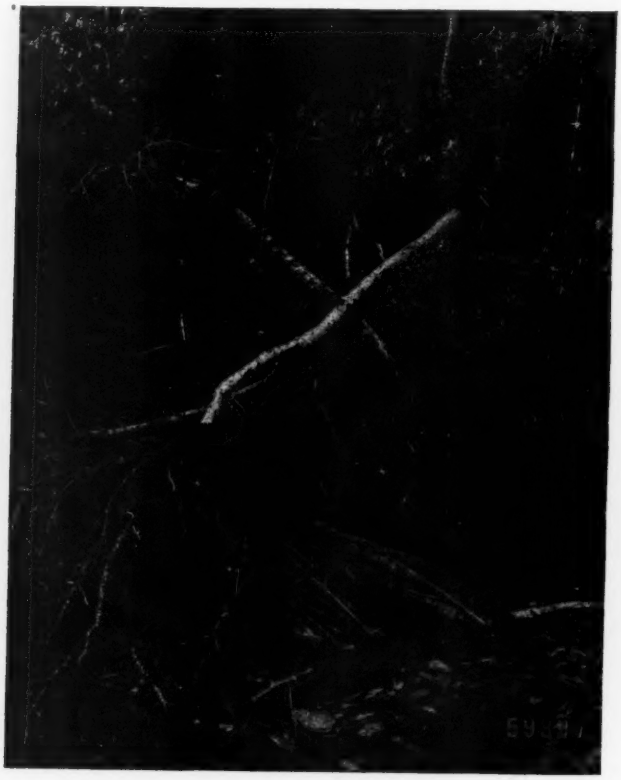

Fig. I. Black Birch Tree Peeled for Oil.

The iron pipe is laid in a trough through which the water from a brook is deflected. The steam and vaporized oil passing in mixture into the worm is condensed there and the resulting water and oil trickles by drops into a

glass jar placed under the end of the pipe. Over the mouth of the jar is stretched a piece of cloth through which the oil and water are strained.

The oil sinks to the bottom of the jar as a dark red aromatic oil, and the smoky water from the worm remains on top, being lighter. As the jar overflows the water passes by a trough to the boiler in the bottom of the still where it is boiled over again. In this way, besides keeping the boiler filled automatically, there is the additional advantage that any unseparated oil which has failed to precipitate in the jar returns to the still to be again vaporized and condensed. (See illustration No. III.)

When the jar is about half full of oil—an amount which is equivalent to about one and one-half pounds of crude oil—all the oil is extracted. The bark is then shoveled out and discarded and the still refilled. About twenty-four hours of boiling is required to extract all the oil, and to get the best results it is said the water should be kept boiling continuously. This is never done, however, at least in the region studied.

The oil is sold by the distillers at local drug stores. It is sold by the pound Troy weight, 13 fluid ounces to the pound. These stores sell it in New York and other eastern markets 12 ounces to the pound. The stores claim that they are obliged to buy it at 13 ounces to the pound on account of its averaging 1 ounce of water and other foreign matter per pound, which they have to remove.

Fig. II. The Condenser of a Birch Still.

The price of crude oil changes with the market. It is sometimes as low as $1.25 a pound and again the price will run as high as $3.00 per pound. The storekeepers in the local towns ship it in 3-gallon cans in its crude form to the chemists in New York and other eastern cities, selling it at an advance of about 25 to 30 per cent. more than they paid for it.

The wholesale chemists refine it and sell it as "essential oil of wintergreen." This is the "natural oil." "Artificial

oil" is made by a purely synthetic process in the laboratories. Chemically, it is exactly the same, and being produced at less expense sells at a much lower price. The price of the natural oil, as quoted by a wholesale chemist, April, 1905, was $2.50 per pound, while the artificial oil was quoted at 75 cents. These were prices on oil sold in small amounts. In 25-pound cans the price was $1.85 for the natural oil, and the artificial oil sold for

Fig. III. A Mountain Birch Distillery.

50 cents in 5-pound bottles, or 42 cents in 50-pound cans. Larger quantities were sold at correspondingly lower figures.

I was told that a birch tree 12 inches in diameter yields $2.25 worth of crude oil. Taking this as the average price per pound of 13 fluid ounces, and considering 12 inches as the average size of the trees felled for the purpose, the average tree will yield one pound of oil. I was unable to get a statement as to the amount of chipped bark obtainable from a single tree, but since a vat-full, equivalent to 36 cubic feet, yields one and one-half pounds of oil, and an average tree yields about one pound, it is safe to say that the bark from the average tree will fill the still two-thirds full, equivalent to 24 cubic feet of chipped bark which yields 1 pound of oil.

Deducting 20 cents, the price paid per tree to the owner of the timber, from the price realized on the oil it will produce, or say $2.20, the profit to the producer of the crude oil is $2 per tree or per pound of 13 ounces. When it is considered that two-thirds of 24 hours, or 16 hours are spent in distilling one pound of oil, besides the labor and time involved in felling the tree, chipping the bark, and feeding the fire, the actual returns are not great. When two or more stills are in operation at the same distillery, as is usually the case, the question of time involved is not of as great weight

since it takes no more time to distill three pounds of oil from three stills than it does one pound from one still, but the larger distillery entails a greater labor to chip a larger amount of bark and to keep the vats full and the fires fed. Usually, however, the labor in the process involved is not considered by the distiller from its economic standpoint.

SPRUCE FORESTS OF THE WHITE MOUNTAIN REGION

BY

AUSTIN CARY

THE White Mountains of New Hampshire contained in their native condition some of the finest spruce timber in New England, as heavy a stand perhaps as stood on any like area within the whole region of distribution of the species. These were not among the first New England forests to be cut through. The ground they stood on was so steep and rough and the streams which drained it, many of them, so ill adapted to log driving that it was not till the advent of railroads that the timber in these forests, thick and fine as it was, could be logged at a profit.

Meanwhile there arose in the Northeast and gathered in part about these woods, because they furnished the raw material, the pulp and paper business. The rapid development of this industry injected great values into the forests tributary to it. It had further this peculiarity as against the saw-mill business which claimed the more accessible and better watered forests of the Northeast, that a tree of very small size was merchantable. The logs which come to an eastern pulp mill would look very queer to lumbermen in most other parts of the country. Trees 8 inches in diameter at the stump as a rule are worth nearly as much per M standing as larger timber, and the cutting limit in this region for spruce and fir frequently is and has been even somewhat smaller.

Thus we have a striking contrast between cut and uncut lands in the region, a contrast which holds in every relation in which they can be conceived of. It holds in respect to value in the first place. Well timbered spruce land may be worth, to cut at once, anywhere from $20 to $100 per acre, while the cut-over land is hardly worth paying taxes on. Then it holds good in every protective relation. The virgin lands have a fine thick stock of trees which clothes the ground fully, keeps the soil moist, and is safe from wind throw. Spruce lands that have been newly cut, on the other hand, are an almost continuous brush heap. If scattering trees are left, either soft or hardwood, they frequently blow down. The country is very inflammable; reproduction is put at every disadvantage. Of course not all of the country is left as badly off as that. Easy valleys and ridges where there is a large proportion of hardwood, the severest kind of logging cannot deprive entirely of their cover. What is left, however, may be of little or no commercial value and an actual impediment as regards useful reproduction.

The effect of these conditions outside the White Mountain region is a difficult matter and will not be dealt with by the present writer. Within the White Mountain forests it would seem as if there could be no disagreement as regards either the conditions

or their effects. These, it will be well to review and deal with a little more fully.

First. No erosion of great amount need be feared here. Deep cutting the hranite rocks of New Hampshire may be counted on to resist. The wash also of the surface soil and its vegetable cover is believed to be confined to very small districts.

Second. There is generally a liberal reproduction of one thing or another on the cut-over lands, no matter how they were cut. Nature provides this in spite of us, and we have only to protect it. As a rule, too, the new growth is of good type. Where spruce and fir stood before, fir and spruce come up again. There is more bush growth and worthless stuff amongst the regrowth in stands of soft and hardwoods.

Third. From the steep mountain slopes left in the shape they are by lumbering, the snows of winter melt very rapidly, and run into the streams much earlier in spring than they did when those slopes were timbered. The run-off of rain is not so easy to follow, but in respects to this there can be far less difference between cut and uncut land. Whatever these changes may amount to in their effects outside, it fair to say that conditions within the mountains are such that it would seem we must have got their full force already on every primary drainage except that of the Merrimac river.

Fourth. Fire, where it occurs, emphasizes all the bad conditions brought about by cutting, and does on its own account fresh and irreparable damage. It destroys advance growth that was on the ground already, and by burning up seed trees accidentally left destroys the means of fresh reproduction as well. Its destruction of soil, too, is oftentimes complete. The loss of the soil cover of rotten leaves, moss and roots is a detriment to any forest, but in large parts of the White Mountain district it means the whole thing. Fire on cut-over land, as a rule, postpones for some decades the re-establishment of a productive forest and of forest conditions. In some places it destroys the possibility of forest growth for centuries. The first requisite for the maintenance of woods here whether valued for their productive or protective capacity, is effective fire protection.

The question now arises whether any other than a governmental agency can be looked to to do the right thing in the way of protection and management for these woods. Are not the industrial forces there such that they will themselves work out the problem in time? Can educational agencies be brought to bear or co-operation planned between owners and the state which will secure to the woods the treatment they deserve and require? Paper mill companies, for instance, in some instances and situations have handled their woods carefully and conservatively, as well probably as in the general interests of the public need be asked. Is their complete dominance in the White Mountains likely, and if it is, can it be looked to to secure, even after the lapse of time, the steady care and foresighted treatment which the woods require?

This is a matter of judgment, and different men might look at is differently. In the opinion of the writer there is no sufficient relief to be looked for in that direction. The reasons for this lie far back in the topography of the region, the forest conditions and the stand of timber. These mountains, as a rule, can't be handled as selection forests. Operation is too expensive and the risk to thinned woods from fire and wind too great. Clean cutting for a private owner is the only possible policy to pursue, and when that has taken place the value of the land is too small and the prospect of the future crop too distant to induce an individual or a corporation to provide the adequate protection. Public protection the case absolutely demands, and public ownership also is required if we are to secure for that policy either its utmost efficiency or

its just reward. The aesthetics of the situation and equalization of water-flow left entirely out of account, the future contribution of the White Mountain region to mere commercial prosperity, its permanent yield to manufacturing industries based on timber, seem to be bound up in public ownership and control.

And the fact that hampers and limits use in one direction is in another the very door of opportunity. That is the low value of the cut-over lands. There are considerable areas in the White Mountains that are worth nothing whatever to their owners. They will hardly pay taxes on them. If they protect from fire in any degree, it is simply for the sake of neighboring timber. With an organization there which is capable of meeting business men with their own tactics and on their own ground, large areas of land can be acquired at very moderate expense. One thing that is necessary for such an organization to have, is authority when they condemn or purchase lands to allow to the owners under whatever restrictions are thought reasonable, the removal of the merchantable timber.

FORESTRY IN MARYLAND*

BY

W. D. STERRETT

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I. GENERAL FOREST CONDITIONS.

The total area of woodland in Maryland comprises about two and one-half million acres, constituting, approximately, 40 per cent of the total land area of the state; something less than 1 per cent of the wooded area is virgin forest. The forests of the state are mostly second growth and under 150 years in age. In the western part of the state there is much recently culled and cut-over virgin forest, with little second growth as yet, or covered with a very small brush growth under 25 feet in height.

The general forest conditions which prevail in Maryland can best be described separately for each of the three physiographic divisions which compose the area of the state: (1) The Appalachian Region, (2) the Piedmont Plateau, and (3) the Atlantic Coastal Plain.

1. *The Appalachian Region.* This composes about 20 per cent of the land area of the state and includes the two most western counties and half of a third adjoining county. This is the most heavily wooded region of the state, and the lumber industry is here of first importance. The region supplies much lumber for the general market, besides the large quantity consumed locally in mines, pulp mills, and for building purposes. About 60 per cent of the area of this division, or some 750,000 acres, is woodland.

The elevation of this region is 500 to 3,400 feet above sea, forming a mountainous country of deep valleys and high ridges. The upper slopes and ridges are unsuited for agriculture, and it is not probable that to any extent additional areas of forest will be cleared for farming purposes, as the best lands are already cleared, and many areas once cultivated are being abandoned on account of their poor soil.

The forests of this region consist mostly of recently culled and cut-over virgin forest, and there has not suf-

*This article is based upon data secured through the co-operative forest work carried on by the Maryland Geological Survey and the U. S. Forest Service, and is printed here with their permission.

ficient time elapsed for second growth of any size to develop. What little virgin forest there is in Maryland is located in inaccessible parts of this region. "The prevailing growth is deciduous, but this is conspicuously mingled with patches and often large areas of conifers.*" "The peculiar position of western Maryland, intermediate between North and South, gives the region a forest flora rich in species,"* there being in all upward of seventy distinct tree species. "Conifers and hardwoods of the middle

Photo by U. S. Forest Service.

Typical Willow Bottomland; Howard County, Maryland.

south and north mingle here almost on the same ground."* The important timber trees occurring in the region include the conifers white pine, hemlock, spruce, pitch, and short-leaf pines, and the hardwoods red, white, and chestnut oaks, chestnut, tulip, poplar, basswood, birch, beech, and maple.

Nearly all the merchantable coniferous trees have already been culled from the forests of this region, and the hardwoods are now rapidly being cleaned out under the highly intensive system of lumbering which has lately been inaugurated in the region. Trees of nearly all species down to very small sizes are used for mine props and lagging. The prevailing forest condition is that of cut-over virgin forest covered with a scattering growth of large defective trees not suitable for lumber, interspersed with reproduction of hardwood sprouts and seedlings and occasional patches of coniferous reproduction. The prevalence of fires following the severe lumbering has greatly deteriorated the quality of the reproduction and second growth, so that the outlook for a valuable future crop is at present not bright.

2. *The Piedmont Plateau.* This comprises about 30 per cent of the land area of the state. It is a fertile region of rolling hills, with a general variation in altitude of 100 to 500 feet above sea, and extends from the Appalachian Region to Chesapeake Bay. It is the most lightly wooded part of Maryland, and the lumber industry is

*Allegany County Report.

here of very slight importance. It is estimated that about 25 per cent of the region is woodland, or some 700,000 acres.

There are no large timber tracts in this region, and the forest area is almost exclusively made up of farmer's woodlots or small tracts, for the most part under 100 acres in area. The forest is second-growth hardwoods, with oak, chestnut, hickory, tulip poplar, and maple the prevailing trees. It is mostly of sprout origin, under one hundred years in age. There is also some old field growth scrub pine in this region. These wood-lot forests are in fairly good condition, as compared with the heavily culled and burned over forests of the Appalachian Region. As the forest areas are usually small and much broken up by fields, pastures, and roads, extensive forest fires do not occur. However, all the woodlots now produce much less timber than they are capable of producing if properly managed. The forest is usually understocked, due to frequent random culling out of timber as needed, instead of systematic cutting.

Photo by U. S. Forest Service.

Loblolly Pine Poles; Worcester County, Maryland.

3. *The Coastal Plain.* About one-half of the area of Maryland is comprised in this physiographic division. The elevation of this half of Mary-

land is less than 100 feet above sea and is for the most part under 50 feet. This region is fairly heavily wooded and the lumber industry is here of considerable importance, but almost exclusively in the manufacture of lumber for local consumption. It is estimated that 40 per cent of the region is wooded, or over one million acres practically, all of which is second growth under 150 years in age. Before the civil war a much larger per cent was cleared and worked as farm land than at present, but since that time much of it has been abandoned and has grown up, for the most part to a thick growth of scrub or loblolly pine.

The forests of this region occur in much larger bodies than in the Piedmont Plateau, but there are no such immense continuous tracts as found in the Appalachian Region. The lumbering here is characterized by an abundance of small saw mills—many portable—in contradistinction from the lumbering in the Appalachian Region, which is carried on mostly by a few large operators. The lumbering is mostly of second-growth yellow pine 40 to 100 years old which has not had time to attain the large dimensions of virgin timber.

The forests of this region are over half yellow pine, which occurs sometimes in mixture with hardwoods, but

Barrens Timber; a Thin Stand, Due to Fire.

more frequently pure. The species of yellow pine which occur, in order of their importance, are loblolly, scrub, short-leaf, and pitch. The pine on land over forty feet in elevation above sea is prevailingly scrub, and below forty feet is mostly loblolly.

In the United States census for 1900 the following figures are given on the lumber industry in Maryland for that year:

Cut of conifers	109,651,000 board ft.
Hardwoods	78,306,000 board ft.
Total	187,957,000 board ft.
Value of product	$2,650,082

Probably about half of this lumber produced was from the mountain region and half from the Coastal Plain, but none to speak of from the Piedmont section.

II. PROGRESS OF FORESTRY IN THE STATE.

The developments of forestry in Maryland has progressed steadily along educational and practical lines. The actual practice of forestry in the state has been entirely by private land owners, as there are as yet no state or federal forest reserves in Maryland. The impulse for private forestry has come chiefly from two sources: (1) The diffusion of literature on forestry by the United States Forest Service and personal advice and assistance given by this bureau to private owners in handling their wood lands; (2) the co-operation of the Maryland State Geological Survey with the United States Forest Service in the investigation and mapping of the forests of the state by counties, including practicable recommendations in regard to forest management by private owners.

Interest in forestry by private owners of woodlands in Maryland may be said to date from October, 1898; so that the forestry movement in the state is as yet little more than seven years old. It was in the fall of 1898 that the Forest Service (at that time the Division of Forestry) issued Circular 21 offering personal advice and assistance to private owners in the management of woodlands. Previous to this the work of the Forest Service had been purely of an educational nature in the diffusion of literature on forestry, and little or nothing in the way of practical private forestry had been accomplished. This offer of personal inspection of wood lands by an expert, followed by practical advice and assistance in handling the forest, gave the initial impetus to private forestry. Many private owners of wood

Photo by U. S. Forest Service.

A Loblolly Pine Forest.

lots in the Piedmont Plateau have availed themselves of the offer of the Forest Service and have had their woodlands examined, and are in consequence carrying out a policy of rational forest management. Little interest as yet, however, has been displayed by the large timberland owners of the Appalachian Region, and no forest working plans have been prepared in this section. Intensive lumbering, prevalence of fires, and slowness of tree growth in this region are great hindrances to the adoption of private forestry. Some forestry work has been done on small tracts in the Coastal Plain, but not as much as in the Piedmont Region. Forest conditions in this section are especially bright for private forest management.

The co-operation between the Forest Service and the Maryland Geological Survey was brought about by Dr. William Bullock Clark, state geologist. It has been his desire to develop all the economic resources of the state, of which the forest is naturally an important one. The work was commenced early in the year 1900, when necessary forest experts were furnished and their salaries paid by the Forest Service, while all traveling and living expenses of the field party were defrayed by the state Geological Survey, and up to the present date the forests of nine out of the twenty-three counties in Maryland have been examined and the wood lands carefully mapped. Reports on three of the counties have been published by the Survey and reports on the others examined are in preparation. It is hoped in this way finally to have a complete forest map of the state, together with a knowledge of what sort of forest management is suitable for the many different forest conditions met with. This knowledge should prove very beneficial to private forest owners in the proper management of their wood lands.

Cut and Culled Forest Hemlock Lands, Castleman River, Garrett County, Maryland.

Another line of forest work done in Maryland is that of special investigations carried on in the state by the

federal forest service. An excellent study of the growth of chestnut in southern Maryland was made and a report published, which includes many useful tables of growth and volume and practicable recommendations in regard to the management of the species. A similar study has been made of scrub pine, and a report will shortly follow.

To summarize, the forestry movement in Maryland up to the present time has consisted in the gradual education of private forest owners with the ideas and principles of forestry through the agencies of the Federal Forest Service and the Maryland Geological Survey, and to some extent inducing these owners to practice forestry wherever it may be shown to be a wise business proposition. As yet there has been no legislative action of importance by the state with reference to its forests. There is one rather inadequate forest law in regard to trespass, and another in regard to fire, the latter applicable to one county. The time is now ripe for the state to take action and pass laws that will further the cause of forestry and promote one of its most valuable economic resources. The returns from an ill-treated and neglected forest will often be less than a third of those which could be derived from the same forest under proper management, and this is a sufficient economic reason for such state action as will promote the welfare of its forests. There is under preparation a bill, to be placed before the Maryland legislature this winter, providing for adequate forest legislation. The principal points to be included in the bill are: The appointment of a state forester and an outline of his duties; adequate fire laws, and the power of the state to accept and to administer as forest reserves gifts of forest lands. If the bill goes through in the form desired, forestry in Maryland will be put on a much more progressive and permanent basis. The development of private forestry in the state would be greatly facilitated by

Ridge Timber, Chestnut and Oak, Backbone Mountain, Garrett County, Maryland.

proper fire laws; the state forester should help greatly in disseminating the ideas and principles of forestry and in inducing owners to practice forestry wherever it can be shown to be financially profitable. Finally, the power of the state to accept and administer gifts of forest land as reserves would bring about the actual practice of forestry by the state, which should afford a good example in forest management to private owners, as well as eventually being made a source of revenue.

Hemlock and Hardwoods, near Bevansville, Garrett County, Maryland.

III. POSSIBILITIES OF FOREST MANAGEMENT IN MARYLAND.

It is proposed under this head to consider the practicability of forest management for the three different regions previously designated:

1. *The Piedmont Plateau.* As already stated, this is the most fertile section of Maryland and the forest occurs in small tracts as woodlots connected with farms. Some form of forestry is here almost always advisable. The wood lot is an indispensable adjunct to a well-equipped farm, to furnish the necessary supply of cordwood, fence posts and rails, bean poles and for a hundred and one other purposes, all requiring that there be a woodlot convenient. The farmer's woodlot furnishes one of the best possible opportunities for economic forest management. The farmer has the best chance to bring his woodlot up to the highest possible productive state; the farmer has leisure time during the winter to work in his woodlot and improve it; he can usually find use for inferior and defective trees which should be removed for the benefit of the trees remaining. It will, in short, pay him to make improvement cuttings. The more valuable the land is for agriculture the more intensive should be the forest management in order to realize a reasonable rate of interest on the investment. Where the reproduction and second growth following clear cutting is insufficient, the

White Oak and Hemlock, near Bevansville, in Garrett County, Maryland.

Making a Charcoal Kiln.

natural reproduction should be supplemented by planting or sowing in order that the future stand may be fully stocked and produce a high yield of timber. The farmer will in the end be abundantly repaid if he uses his spare time in the improvement of his woodlot.

Timber brings a good price in this section because of its scarcity, especially such species as chestnut, oak, walnut, and hickory. The growing of chestnut for poles and ties is an especially good proposition, as shown by the bulletin of the United States Forest Service on the subject.

2. *The Appalachian Region.* As previously stated, the outlook for private forest management in this section is not promising, due to the intensive form of lumbering practiced, the prevalence of fires, damaging young growth, and the general slowness of tree growth. No owners of large timber tracts in this part of the state have as yet taken up the idea of conservative treatment of their wood lands. Forest management in this region could best be carried on by the state, rather than by private owners, owing to the long rotation required here to mature timber. There is an increasing amount of cut-over land in this section, non-agricultural and suitable only for growing trees, which will not have a second valuable crop of timber for fifty to seventy-five years, and then only if properly managed. There is no very great inducement for the individual to properly care for such forest land, with the harvest so far off; while, if managed by the state, the welfare of the next generation would be considered and the forest carefully handled accordingly.

There are some woodlots in this region, adjacent to farms, and for such small tracts private forest management will be advisable. At present, however, not such intensive forestry will be practicable for these woodlots as for those in the Piedmont section, where the land is more valuable and timber much scarcer. But the farmers here should try to keep out fire and improve their wood lots by thinning out worthless and hindering material, so far as it can be done without financial outlay.

3. *The Coastal Plain.* The rapid-growing loblolly and scrub pines in this section, which attain merchantable size in thirty to sixty years, are good propositions for private forest management, especially the loblolly. Most of the land on which this pine occurs is of little value for agriculture, and will often bring better returns from growing timber on short rotations than from crops. In thirty years the scrub pine is valuable for pulpwood or charcoal. The loblolly it is best to cut for lumber as it is sufficiently large in thirty-five to forty-five years.

The outlook for forestry on wood lots in this section is nearly as good as for the Piedmont Region, though timber prices are not as a rule so high.

RECENT PUBLICATIONS

Forestry and Forest Products of Japan. Bulletin of Bureau of Forestry, Department of Agriculture and Commerce, Tokyo, Japan. Published for distribution at the Universal Exposition, St. Louis, 1904. Pp. 118, with diagrams. Tokyo, 1904.

The forest administration of the Japanese Empire is regulated by the Forest Law of 1897, providing rules regarding the working of the "Available Forests," as well as the restriction of felling in the "Reserve Forests." At the present date the reserve forests of the Empire include 699,148 *cho*, or some 269 square miles, and the government has a well-defined forest policy, whose range of activity is remarkable. In results accomplished, explained in this book in a very interesting manner, the Japanese forest service will rank high with that of other nations. This volume is full of informa-

ti i that is interesting to the American forester and forest student, and contains some very valuable increment tables of Japanese trees, descriptions of the various types oi forest, and of some of the more important tree-species, together with an interesting exposition of the workings of the government forest service.

Report of the Pennsylvania Department of Forestry for the Years 1903 and 1904. Pp. 106, illustrated. State Printer, Harrisburg, 1904.

Mr. Robert S. Conklin, Commissioner of Forestry, state that his department is conducting a "work which is constantly on the increase, and coming to be most important, affecting as it does the well-being of our citizens and the whole industrial life of the commonwealth. The report here presented includes a report of Dr. J. T. Rothrock, Commissioner of Forestry during 1903, and until May 31, 1904, and of his successor, Mr. Conklin, from June 1, to December, 1904. There are also included the report of the State Forester, Mr. George H. Wirt; a report of the Camp Sanatorium for poor consumptives, at Mont Alto, by Dr. Addison M. Rothrock; a report on the State Forest Academy at Mont Alto; a paper detailing a "Rational Method for the Cultivation of the Willow," by Mr. Paul E. Arnold; a "History of Forest Fire Legislation in Pennsylvania, as a Province and State," by Irwin C. Williams, Esq., Deputy Commissioner of Forestry; and a statement of the amount of timber cut and the losses by forest fires during two years, tabulated from data collected by the department.

Annual Report of the Smithsonian Institute for 1904. Pp. 804, illustrated. Government Printing Office, Washington, 1905.

Included in this report are two articles which should be of unusual interest to readers of this magazine, "The Work of the Reclamation Service," by F. H. Newell, Chief of the U. S. Reclamation Service, and "The Yuma Reclamation Project," by Mr. J. B. Lippincott, Supervising Engineer, U. S. Reclamation Service. The volume contains, as usual, a mass of scientific data and information that is as interesting as it is valuable.

Report of the Secretary of the Interior for the Fiscal Year Ending June 30, 1905. Pp. 286. Government Printing Office, Washington, 1905.

The administration of the public lands of the United States, the construction of government irrigation works under the Reclamation Act, the administration of the national parks and reservations, the mapping and surveying of the United States, are a few of the branches of activity which are centered in the Department of the Interior, and in which readers of FORESTRY AND IRRIGATION should be interested. In the volume presented here is included also a report on the workings of the General Land Office in the administration of forest reserves prior to July 1, 1905, when that work was transferred to the U. S. Forest Service.

In the fields of both irrigation and forestry the report shows a gratifying amount of work done in furtherance of these two all-important subjects.

Report of the Secretary of Agriculture, 1905. Pp. 132. Government Printing Office, Washington, 1905.

Of particular interest in this report is the summary of work accomplished during the fiscal year of 1905 by the divisions of the Agricultural Department having in charge the forest work and the irrigation investigations of the government. Referring to the first, the Report states: "The work of the Forest Service has been greatly developed. Of the eleven persons employed July 1, 1898, only two were professional foresters. To-day the Forest Service employs 153 professional foresters out of a total force of over 800 persons. An important achievement of this Service during the past few years has been to enlist the sympathy and co-operation of lumbermen and forest owners, and the Secretary urges that the work of education continue until public opinion will not tolerate heedness waste or injudicious loss. The forest reserve property of the government is administered at a cost of less than one-third of 1 per cent of its value, which increases at the rate of 10 per cent per annum."

Of the Division of Irrigation and Drainage, the Secretary reports:

"The irrigation and drainage investigations of the Department have resulted in the systematic study of the agricultural and legal features of irrigation. Measurements of the quantity of water used in ordinary practice have been followed by more careful experiments to determine the frequency of irrigation and the amount of water to be applied to get the best results. The studies of irrigation laws have included the collection of facts showing the character and amount of water rights. Experiments are being made to determine how far drainage can be made to protect hillsides from destructive effects of erosion." The report is replete with valuable information and statistical data regarding the government work carried on by the Department of Agriculture.

PUBLISHERS' NOTES

Of special interest to the tree planter and forester is the price list of seeds of trees, shrubs, etc., issued recently by Thomas Meehan and Sons (Inc.), of Dreshertown, Montgomery county, Pa. This firm was probably the first in the United States to realize the need for forest planting of seeds of the better-known species of forest trees, and through a long period of business activity their customers have learned to appreciate the unusual efforts the firm exerts to secure sound seed of the best stock. Precautions are taken to positively identify all trees from which seeds are secured, and the customer is assured of receiving the species ordered—not that of some inferior variety. Their "Tree Catalogue" gives detailed information of the firm's stock and their facilities, and any of our readers having occasion to do planting, whether in landscape gardening, or in forestry, will find it of interest and value.

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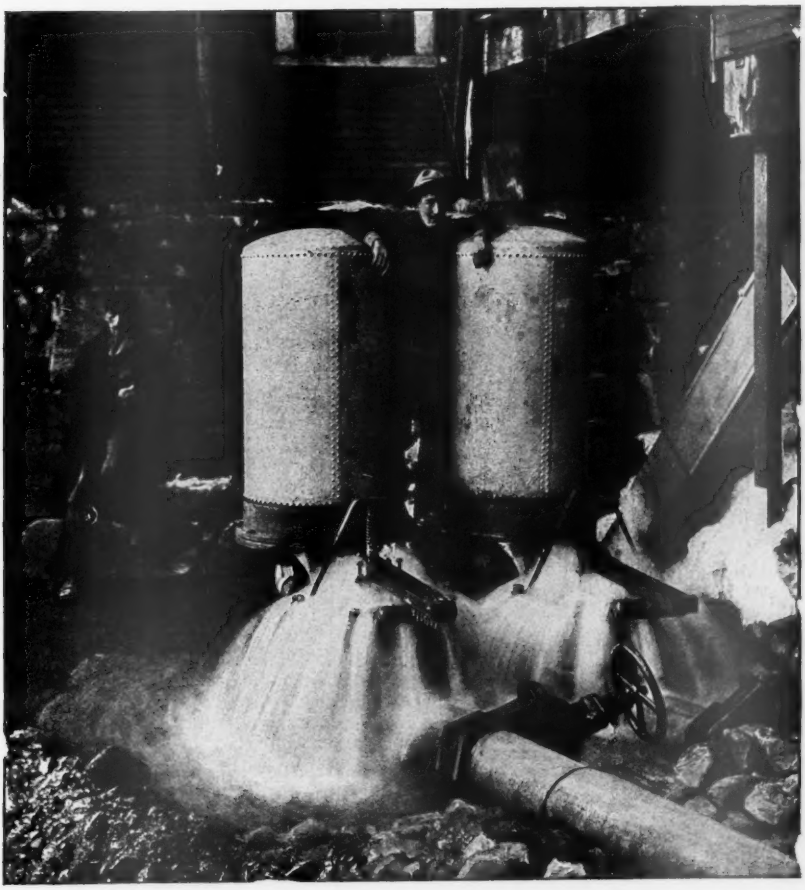

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CLASS.

1. Aquatic Life, Living Specimens (Marine and Water Fishes).
2. Fish Culture.
3. Food for Fish.
4. Aquatic Plant Life.
5. Casts and Drawings.
6. Anglers' Equipment.
7. Nests and Fishing Equipment.
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9. Literature.
10. Taxidermy.

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2. Skins and Furs.
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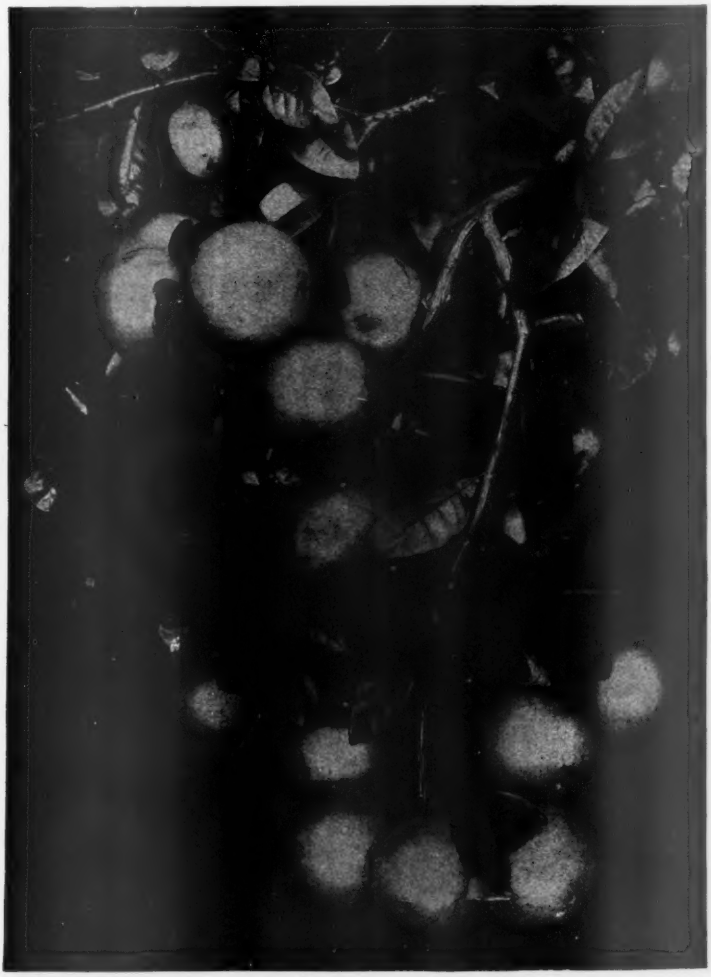

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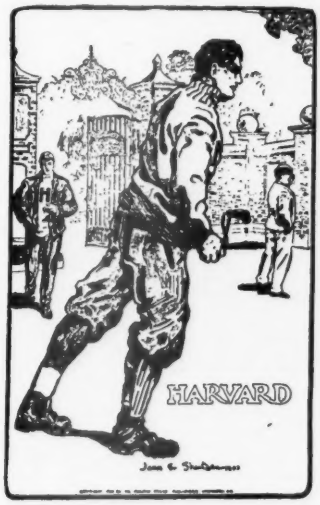

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2. The preservation and development of our national resources by the construction of storage reservoirs by the Federal Government for flood protection, and to save for use in aid of navigation and irrigation the flood waters which now run to waste and cause overflow and destruction.

3. The construction by the Federal Government of storage reservoirs and irrigation works wherever necessary to furnish water for the reclamation and settlement of the arid public lands.

4. The preservation of the forests and reforestation of denuded forest areas as sources of water supply, the conservation of existing supplies by approved methods of irrigation and distribution, and the increase of the water resources of the arid region by the investigation and development of underground supplies.

5. The adoption of a harmonious system of irrigation laws in all the arid and semi-arid states and territories under which the right to the use of water for irrigation shall vest in the user and become appurtenant to the land irrigated, and beneficial use be the basis and the measure and limit of the right

6. The holding of an annual Irrigation Congress, and the dissemination by public meetings and through the press of information regarding irrigation, and the reclamation and settlement of the arid public domain, and the possibilities of better agriculture through irrigation and intensive farming, and the need for agricultural education and training, and the creation of rural homes as national safeguards, and the encouragement of rural settlement as a remedy for the social and political evils threatened by the congestion of population in large cities.

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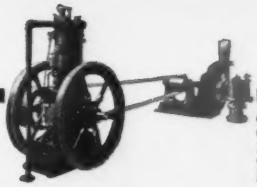

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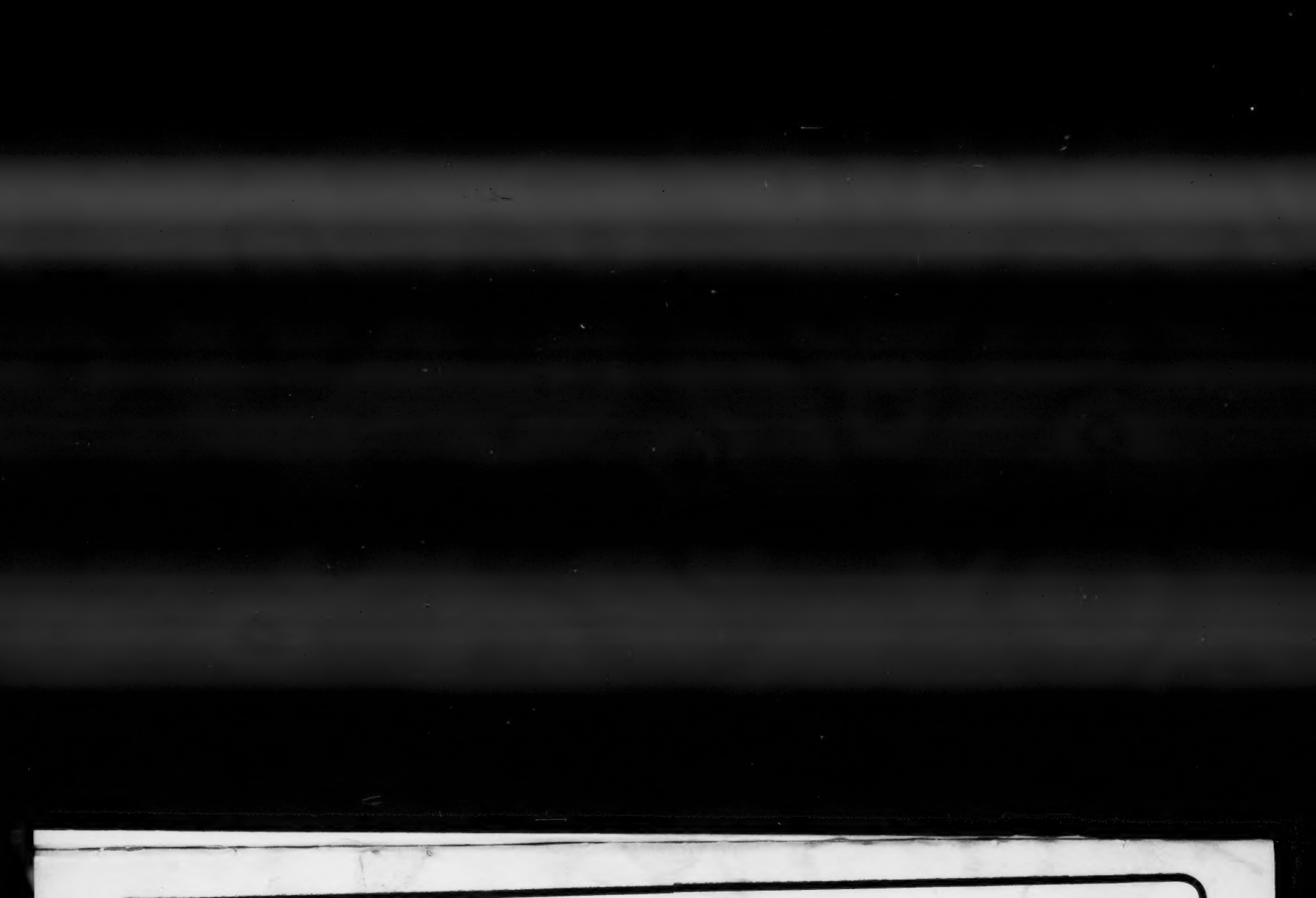
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